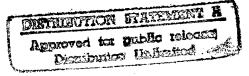
# Limited Energy Study (Glass)

# Energy Engineering Analysis Program (EEAP) Fort Knox, Kentucky

Final Report Volume 2 of 3

CONTRACT #DACA01-94-D-0034 SYSTEMS CORP PROJECT #94013.02 OCTOBER 28, 1994





19971016 187

SYSTEMS<sub>corp</sub>

SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION
Cherokee Place, Suite 306 ♦ 2200 Sutherland Avenue ♦ Knoxville, Tennessee 37919
Telephone 615-521-6536 Fax 615-524-7514

### DEPARTMENT OF THE ARMY

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS P.O. BOX 9005

CHAMPAIGN, ILLINOIS 61826-9005

REPLYTO ATTENTION OF:

TR-I Library

17 Sep 1997

Based on SOW, these Energy Studies are unclassified/unlimited. Distribution A. Approved for public release.

Librarian Engineering

# VOLUME II

4.	ECIP PROJECT 2
	Infra-red Heat at Buildings:
	2762-2767
	2770
	2778
	2781
	2942-2944
	6113-6118
	6142-6147
	6560-6564
	6576
	6577
	6592
	(Includes FEMP Project 3)

# 4 ECIP PROJECT 2: INFRA-RED HEAT AT 31 BUILDINGS

FY94 LIMITED ENERGY STUDY (GLASS), FT. KNOX, KY

This section contains the project description and the DD 1391 Forms for ECIP Project 2: Infra-red Heat at 31 buildings. Following the DD 1391 Forms is a project summary table, the life cycle cost analysis for the project, and the life cycle cost analysis, cost estimates, and calculations for each building/area included in the project. This ECIP project also includes an FEMP project. This FEMP project is referred to as FEMP Project 3 and includes buildings 2762-2767, 2778, 2781, 2770, 2942-2944. Below is a detailed index of the information included in this section.

DD 1391 Forms
Fable 4.1: Project Summary - Infra-red Heat at 31 Buildings       4-6
ECIP Project 2 LCCA
ECIP Project 3 LCCA
Buildings: Page
2762-2767, 2778 & 2781
2770 4-119
2942-2944
5113-6118, 6142-6147
5560-6564, 6576 & 6577
5592
Catalog Cut Sheets 4-436

DATE 28 October 1994 PROJECT NO.: ECIP 2

PROJECT TITLE: ECIP - Heating Systems

INSTALLATION: Fort Knox LOCATION: Kentucky

PRIMARY FACILITY

Infrared Heating Systems

1,786,000

ESTIMATED CONTRACT COST CONTINGENCY PERCENT (10%)		\$ 1,475,763 \$ 147,576
SUBTOTAL	•	\$ 1,623,339
SUPERVISION, INSPECTION & OVERHEAD (	5%)	\$ 81,167
DESIGN (5%)		\$ 81,167
TOTAL REQUEST		<u>\$ 1,785,673</u> <u>\$ 1,786,000</u>
TOTAL REQUEST (ROUNDED)	•	\$ 1,786,000

Modernize heating systems in 31 high and low bay buildings on Fort Knox with infra-red heaters. This project will perform the following energy engineering improvements to the heating systems.

- 1). Replace the existing hot water and steam heating systems with infra-red heaters. This includes all areas heated by the existing boiler systems in the 31 buildings. Construction costs include the demolition of the existing heating systems.
- 2). All infra-red heating systems will be natural gas with electric ignition. The construction costs include bring the natural gas distribution systems to the buildings currently served by fuel oil. This will eliminate the need for underground fuel tanks at these 31 facilities.

DATE 28 October 1994 PROJECT NO.: ECIP 2

PROJECT TITLE: ECIP - Heating Systems

INSTALLATION: Fort Knox LOCATION: Kentucky

### PROJECT:

Modernize heating systems in 31 high and low bay buildings on Fort Knox with infra-red heaters.

### **REQUIREMENTS:**

Fort Knox operates numerous buildings with outdated, inefficient heating systems. The low efficiency on the existing systems allows wasted usage throughout the heating seasons. These inefficient heating systems drive up the consumption of fuel oil and increase the dependency on foreign oil supplies. The US Army Corps of Engineers, Louisville District, contracted an Energy Engineering Analysis Program to study the heating systems in 31 buildings on Fort Knox. The study identified energy conservation opportunities and performed a life-cycle cost analysis on each opportunity to determine its discounted savings-to-investment ratio (SIR) and estimated payback period. this project capitalizes on identified energy savings opportunities with an SIR greater than 1.25 and a payback period of no more than 10 years.

### CURRENT SITUATION:

Numerous Fort Knox facilities currently operate with inefficient heating systems. Many of the buildings in this project are high-bay maintenance facilities with hot water and steam unit heaters. Many of these buildings set the thermostats at 65 to 75°F in the effort to keep occupants warm. These facilities consume more energy than is necessary for their operation. Many of these facilities use fuel oil as their fuel source. Natural gas is a less expensive and cleaner fuel source.

### IMPACT IF NOT PROVIDED:

If this project is not provided, 31 buildings will continue to operate with inefficient heating systems, consuming unnecessary energy. The U.S. Army will fail to realize an estimated \$258K in annual savings (FY95\$) and a total discounted savings of \$5.1M in the twenty year life of the project.

### ADDITIONAL:

A life cycle cost analysis was performed on each portion of this project and on the overall project. The overall project will realize an energy savings worth over <u>2.5</u> times the initial investment cost and will pay for itself in less than <u>6.9</u> years.

Fort Knox is not on the list of installations considered for closure or realignment.

DATE 28 October 1994 PROJECT NO.: <u>ECIP 2</u>

PROJECT TITLE: ECIP - Heating Systems

INSTALLATION: Fort Knox LOCATION: Kentucky

SECTION 11 - ECONOMIC ANALYSIS DATA

11D ECONOMIC JUSTIFICATION SUMMARY

This energy conservation project is recommended for funding. A life cycle cost analysis was performed on each portion of this project and on the overall project. The overall project will realize an energy savings worth over <a>\( 2.5</a> times the initial investment cost and will pay for itself in less than <a>\( 6.5</a> years.

DATE 28 October 1994 PROJECT NO.: ECIP 2

PROJECT TITLE: ECIP - Heating Systems

INSTALLATION: Fort Knox LOCATION: Kentucky

### Source:

Project investment costs and projected energy and non-energy savings are developed in an Energy Engineering Analysis Program (EEAP) developed in 1994 by Systems Engineering and Management Corporation under contract with the U.S. Army Corps of Engineers, Mobile District. Projected energy savings are based on an energy usage survey conducted at Fort Knox and on actual FY94 energy costs to the installation. Investment costs are inflated to reflect FY95 construction costs.

# TABLE 4.1 PROJECT SUMMARY: INFRA-RED HEAT - ECIP PROJECT 2 (INCLUDING FEMP 3)

ECO NUMBER	BUILDING NUMBER	BASELINE ENERGY (MBTU)	ECO ENERGY (MBTU)	ENERGY SAVINGS (MBTU)	1ST YEAR SAVINGS	INVESTMENT	NON-ENERGY ANNUAL RECURRING	TOTAL NON-ENERGY NON- RECURRING	SPB (YR)	SIR
~	2762 - 2767, 2778 &									
	2781		8,901	9,247	\$48,583	\$483,650		\$77.604	96.6	2.03
-	2770	29,139	14,292	14,847	\$73,478	\$271,299		\$58,088	3.69	5.57
<del>-</del>	2942 - 2944		4,190	4,353	\$44,565	\$226,146	\$2,970	\$91,335	2.07	3.12
	FEMP PROJECT 3	55,831	27,383	28,448	\$166,626	\$981,094	\$6,930	\$227,026	5389.00	3.26
-	6113-6118,6142-6147	14,811	7,265	7,547	\$77,721	\$503,778	\$3,960	\$191.341	6.48	2.44
-	6560-6564,6576,6577	6,569	3,222	3,347	\$36,858	\$263,339	\$2,970	\$108,338	7.14	2.22
τ-	6592	1,317	646	671	\$4,810	\$37,462	\$990	\$14,407	7.79	2.41
-	ECIP PROJECT 2 INCL FEMP 3 & 4	78,529	38,516	40,013	\$286,015	\$1,785,673	\$14,850	\$541,112	6.24	2.86
	EXCP1. 5220 & 5253									

			SIR	2.03	5.57	3.26	2.44	2.41	2.86
		The state of the s	SPB (YR)	96.6	3.69	5389.00	6.48	7.79	6.24
			TOTAL NON-ENERGY NON- RECURRING	\$77.604	\$58,088	\$227,026	\$191,341	\$14,407	\$541,112
		7 1 7	NON-ENERGY ANNUAL RECURRING	***************************************	\$1,980	\$6,930	\$3,960 \$2,970		\$14,850
	PROJECT SUMMARY:	AP 3)	INVESTMENT	\$483,650	\$271,299 \$226,146	\$981,094	\$503,778 \$263,339	\$37,462	\$1,785,673
TABLE 4.1	I SUMN	(INCLUDING FEMP 3)	1ST YEAR SAVINGS	\$48,583	\$73,478 \$44,565	\$166,626	\$77,721	\$4,810	\$286,015
TA	PROJECT SUMMARY:	(INCLU)	ENERGY SAVINGS (MJ)	9,756,028	15,663,754 4,592,626	30,012,408	7,962,001	707,863	42,213,641
	P. P		ECO ENERGY (MJ)	996'066'6	15,077,701 4,420,777	28,889,445	7,664,111 3,399,242	681,382	40,634,180
	<b>,</b> -		BASELINE ENERGY (MJ)	19,146,995	30,741,455 9,013,403	58,901,853	15,626,111 6,930,612		82,847,821
			BUILDING NUMBER	2762-2767, 2778 & 2781	ř	FEMP PROJECT 3	6113-6118,6142-6147 6560-6564,6576,6577	6592	ECIP PROJECT 2 INCL FEMP 3 & 4 EXCPT. 5220 & 5253
			ECO NUMBER		4 4	<b>1</b>		Υ-	-

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: PRJT34
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.080
INSTALLATION & LOCATION: FORT KNOX REGION NOS. 4 CENSUS: 3 PROJECT NO. & TITLE: PRJT34 ECIP PROJECT 2 - INFRARED HEAT FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED ANALYSIS DATE: 10-26-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH 1. INVESTMENT A. CONSTRUCTION COST \$ 1623339.

B. SIOH \$ 81167.

C. DESIGN COST \$ 81167.

D. TOTAL COST (1A+1B+1C) \$ 1785673. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0. F. PUBLIC UTILITY COMPANY REBATE G. TOTAL INVESTMENT (1D - 1E - 1F) 1785673. 2. ENERGY SAVINGS (+) / COST (-) DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1993 UNIT COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5) FUEL 3468106. 976935. 0. 0. \$ 0. \$ 4445041. 40013. \$ 244110. N. TOTAL 3. NON ENERGY SAVINGS(+) / COST(-) 14850. A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) (2) DISCOUNTED SAVING/COST (3A X 3A1). 218889. B. NON RECURRING SAVINGS (+) / COSTS (-) SS(+) / COSTS(-)

SAVINGS(+) YR DISCNT DISCOUNTED

COST(-) OC FACTR SAVINGS(+)/

(1) (2) (3) COST(-)(4)

\$ 137057. 5 .86 117869.

\$ 137057. 15 .63 86346.

\$ 25148. 7 .81 20370.

\$ 25148. 14 .65 16346.

\$ 216702. 3 .91 197199. ITEM 1. REPAIR 2. REPAIR2 3. REPAIR3 4. REPAIR4 5. ENVIR \$ 541112. d. TOTAL 438129.

- C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 657019.
- 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 286015.
- 5. SIMPLE PAYBACK PERIOD (1G/4)

6.24 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)

\$ 5102060.

7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = (1F < 1 PROJECT DOES NOT QUALIFY)

2.86

8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

8.66 %

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.080 INSTALLATION & LOCATION: FORT KNOX REGION NOS. 4 CENSUS: 3 PROJECT NO. & TITLE: PRJT3 FEMP PROJECT 3 - INFRARED HEAT FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED ANALYSIS DATE: 10-18-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH 1. INVESTMENT A. CONSTRUCTION COST \$ 891904.

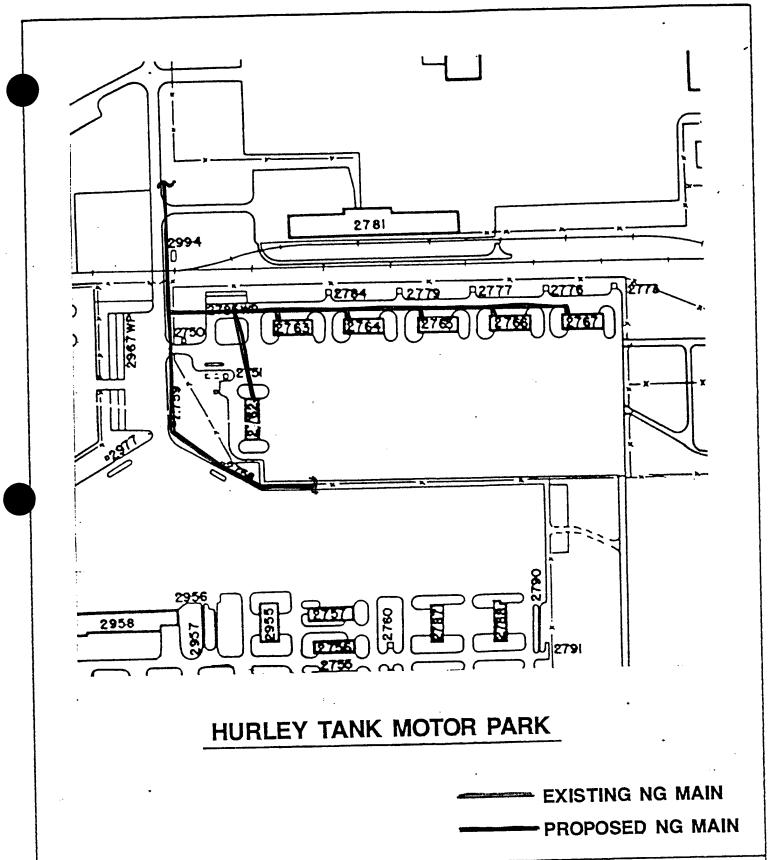
B. SIOH \$ 44595.

C. DESIGN COST \$ 44595.

D. TOTAL COST (1A+1B+1C) \$ 981094. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0. F. PUBLIC UTILITY COMPANY REBATE
G. TOTAL INVESTMENT (1D - 1E - 1F) 0. 981094. 2. ENERGY SAVINGS (+) / COST (-)
DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1993 UNIT COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5) FUEL 990159. 0. 1927434. 0. 0. 0. 2917593. 3. NON ENERGY SAVINGS(+) / COST(-) 6930. A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 14.74 (2) DISCOUNTED SAVING/COST (3A X 3A1) 102148. B. NON RECURRING SAVINGS(+) / COSTS(-) (+) / COSTS(-)
SAVINGS(+) YR DISCNT DISCOUNTED
COST(-) OC FACTR SAVINGS(+)/
(1) (2) (3) COST(-)(4)
\$ 66089. 5 .86 56837.
\$ 66089. 15 .63 41636.
\$ 15573. 7 .81 12614. ITEM 1. REPAIR \$ 66089. \$ 15573. \$ 15573. \$ 63703. 2. REPAIR2 3. REPAIR3 14 .65 .91 10122. 4. REPAIR4 3 57970. 5. ENVIR \$ 227026. 179178. d. TOTAL C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 281327. 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 166626. 5.89 YEARS 5. SIMPLE PAYBACK PERIOD (1G/4) \$ 3198919. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) (SIR) = (6 / 1G) =7. SAVINGS TO INVESTMENT RATIO (IF < 1 PROJECT DOES NOT QUALIFY) 9.38 % 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

LIFE CYCLE COST ANALYSIS SUMMARY

STUDY: PRJT3

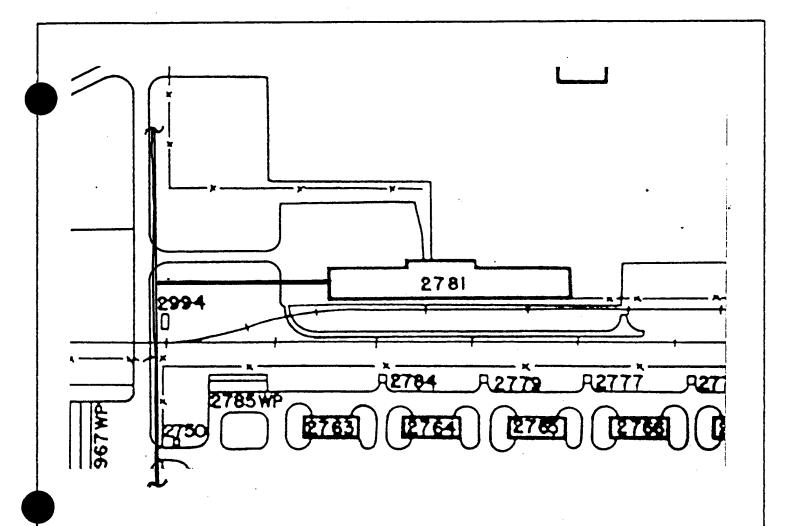


SYSTEMScorp	FT. KNOX GLASS STUDY
SYSTEMS ENGINEERING AND MANAGEMENT CORPORAT. KNOXVILLE, TENNESSEE 37919	NEW NATURAL GAS LINES REQUIRED
DRAWN BY B. YATES JOB NO.	94013.02 SHEET NO.

J. HOLLENSBE DATE

CHECKED BY

10-07-94



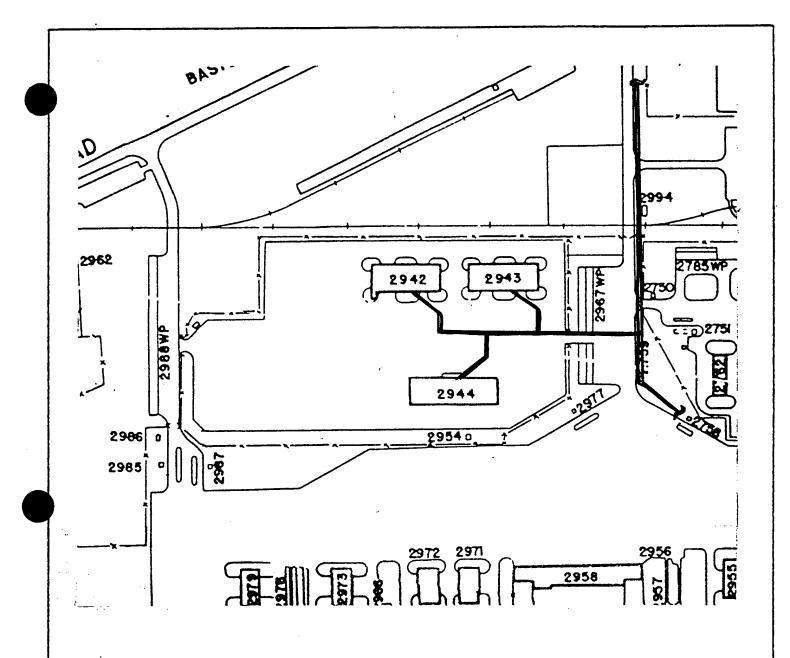
BOATWRIGHT MAINTENANCE AREA - BLDG 2781

**EXISTING NG MAIN** PROPOSED NG MAIN

STEMS ENGINEERING AND MANAGEMENT CORPORATION KNOXVILLE, TENNESSEE 37919

FT. KNOX GLASS STUDY NEW NATURAL GAS LINES REQUIRED

SHEET NO. 94013.02 DRAWN BY B. YATES JOB NO. 10-07-94 CHECKED BY J. HOLLENSBE DATE



# 194TH ARMORED BDE TACTICAL EQUIPMENT SHOPS

EXISTING NG MAIN

PROPOSED NG MAIN

SYSTEMScorp

SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION KNOXVILLE, TENNESSEE 37919 FT. KNOX GLASS STUDY
NEW NATURAL GAS LINES REQUIRED

DRAWN BY B. YATES JOB NO. 94013.02 SHEET NO. CHECKED BY J. HOLLENSBE DATE 10-07-94

PACE 4-11

STUDY: 2762ECO1 LCCID 1.080 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) INSTALLATION & LOCATION: FORT KNOX REGION NOS. 4 CENSUS: 3 PROJECT NO. & TITLE: 2762ECO1 ECO-1 INFRARED HEAT FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED ANALYSIS DATE: 10-18-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH 1. INVESTMENT A. CONSTRUCTION COST \$ 439682.

B. SIOH \$ 21984.

C. DESIGN COST \$ 21984.

D. TOTAL COST (1A+1B+1C) \$ 483650. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0. F. PUBLIC UTILITY COMPANY REBATE Ο. G. TOTAL INVESTMENT (1D - 1E - 1F) 483650. 2. ENERGY SAVINGS (+) / COST (-) DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1993 UNIT COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5) FUEL A. ELECT \$ .00 0. \$ 0. 15.61
B. DIST \$ 6.60 0. \$ 0. 17.56
C. RESID \$ .00 0. \$ 0. 19.97
D. NAT G \$ 4.62 9247. \$ 42723. 20.96
E. COAL \$ .00 0. \$ 0. 17.58
F. LPG \$ .00 0. \$ 0. 16.12 \$ 0. \$ 0. \$ 895476. \$ 0. 0. . 0. 0. M. DEMAND SAVINGS \$ . 0. \$ 42723. 14.74 895476. N. TOTAL 3. NON ENERGY SAVINGS(+) / COST(-) 1980. A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 14.74 (2) DISCOUNTED SAVING/COST (3A X 3A1) 29185. B. NON RECURRING SAVINGS(+) / COSTS(-) (+) / COSTS(-)
SAVINGS(+) YR DISCNT DISCOUNTED
COST(-) OC FACTR SAVINGS(+)/
(1) (2) (3) COST(-)(4)
\$ 32379. 5 .86 27846.
\$ 32379. 15 .63 20399.
\$ 6423. 7 .81 5202.
\$ 6423. 14 .65 4175. ITEM 1. REPAIR 2. REPAIR2 3. REPAIR3 4. REPAIR4 d. TOTAL \$ 77604. 57622. C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 86807. 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 48583. 5. SIMPLE PAYBACK PERIOD (1G/4) 9.96 YEARS \$ 982283. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) (SIR) = (6 / 1G) =7. SAVINGS TO INVESTMENT RATIO 2.03 (IF < 1 PROJECT DOES NOT QUALIFY) 6.82 % 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

LIFE CYCLE COST ANALYSIS SUMMARY

Estimate: Description: Project:	276X AREA COST ESTI	D: MATE	ate: 0	6-Aug-94		
Project: Location: Sq. footage: ====================================	FORT KNOX TRENCHING	, KY JO MAIN LINC:	DD #:	94013.02 Jouisville,	KY	
==========	=======		========	========		
Line #	Descripti	on				
	Manhours	Matl	Labor E	quipment	Sub	Total
=======================================	=======	=======	========	:=======		: = = = = = = = =
0205542200		LITION, PAV	D		40.00	
Unit values Totals		0.00	92.52	133.64 \$5,346	0.00 \$0	226.16 \$9,047
0222541900	TAMPING T	RENCH B'FI	LL, VIBRAT	ING PLATE,	ADD 85.00	C.Y.
Unit values Totals	0.09 7.57	0.00 \$0	1.74 \$148		0.00 \$0	2.41 \$205
0222582800	TRENCH EX			&BKFL 12"W2	1150.00	L.F.
Unit values Totals	0.01 11.50	0.00 \$0	0.24 \$272	0.24 \$272	0.00 \$0	0.47 \$544
0251200400	CONCRETE,	12" THICK	•	SH, 4500 PS	60.00	S.Y.
Unit values Totals	0.05 2.94	17.52 \$1,051		1.02 \$61	0.00 \$0	19.61 \$1,176
	BANK			SAND, DEAD O	21.50	
Unit values Totals	0.16 3.44	2.43 \$52	3.37 \$72	1.37 \$29	0.00 \$0	7.17 \$153
0260120500	BEDDING,	PLACING IN	TRENCH		21.50	C V
Unit values Totals	0.09 1.91	0.00 \$0	1.74 \$37	0.67 \$14	0.00	2.41 \$51
0266907800	CUT IN VA	LVES, W/DU	CK TIP GAS	KET, 4" DIA		П-
Unit values Totals	1.56 1.56		35.47 \$35		1.00 0.00 \$0	300.98 \$301
0268520200		CE & DISTRI AM COIL SD		POLYETHYLE	NE,60- 1150.00	L.F.
Unit values Totals	0.07 77.05	0.75 \$866	1.48	0.00 \$0	0.00 \$0	2.23 \$2,568

,									
Line #	Descriptio	n							
	Manhours	Matl	Labor	Equipment	Sub	Total			
=======================================	========	=======		========		=======			
U02 SITEWORK	275	\$2,229	\$6,031	\$5,785	\$0	\$14,045			
1562600139	GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 2" PIPE SIZE 1.00 Ea.								
Unit values Totals	0.73 0.73	420.00 \$420	16.42 \$16	. 0.00 \$0	0.00 \$0	436.42 \$436			
III5 MECHANICAI.	1	\$420	\$16	\$0	\$0	\$436			

=======================================	=======	=======	=======	========	=======	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	======	======	=======	.======:	=======
ESTIMATE TOTAL	276	\$2,649	\$6,047	\$5,785	\$0	\$14,481
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00% 0.00%	\$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
	ONTINGENC	\$2,649	\$6,047	\$5,785	\$0	\$14,481
CONTINGENCY	10.00%	\$2,0 <del>4</del> 9	\$0,U47	Ş3,763	ŞU	\$1,448
BOND PROFIT	0.00% 10.00%				•	\$0 \$1,448
JOB TOTAL						\$17,377
						+ , - , - ,

\_\_\_\_\_\_

Estimate: 276X AREA Date: 06-Aug-94

Description:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

Project:

JOB TOTAL

Location: FORT KNOX, KY Job #: 94013.02 Sq. footage: TRENCHING MAIN LINCity indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub Total \_\_\_\_\_\_ 275 \$2,229 \$6,031 \$5,785 U02 SITEWORK \$14,045 \$420 U15 MECHANICAL \$16 \$0 \$0 \$436 1 TOTAL 276 \$2,649 \$6,047 \$5,785 \$0 \$14,481 SALES TAX \$0 0.00% \$0 MATL MARKUP 0.00% \$.0 0.00% LABOR MARKUP EQUIPT MARKUP \$0 0.00% \$0 SUB MARKUP 0.00% TOTAL BEFORE CONTINGENC \$2,649 \$6,047 \$5,785 \$0 \$14,481 \$1,448 CONTINGENCY 10.00% BOND 0.00% \$0 PROFIT 10.00% \$1,448

\$17,377

BLDG 2762 14-Oct-94 Date: Estimate: COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY 4800.00 Sq. footage: Description Equipment Labor Manhours Matl \_\_\_\_\_\_ SITE DEMOLITION, PAVEMENT, CONCRETE, TO 0205542200 8.50 C.Y. 24"THICK, REINFORCED 92.52 0.00 226.16 0.00 133.64 Unit values 4.21 35.79 \$0 \$786 \$1,136 \$0 \$1,922 Totals 0205543200 SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 4"DIAMETER 400.00 L.F. 1.29 4.44 0.15 0.00 3.16 0.00 Unit values \$0 \$0 60.00 \$1,262 \$514 \$1,776 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.50 Ton 380.36 0.00 380.36 0.00 0.00 Unit values. 14.55 \$190 \$0 \$0 \$190 Totals 7.27 \$0 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. 0.00 1.97 0.24 0.00 2.21 0.07 Unit values \$395 \$47 \$0 \$442 \$0 Totals 14.20 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 100.00 Ea. DIAMETER PIPE 0.68 6.23 0.20 0.00 5.55 0.00 Unit values \$555 \$623 Totals 20.00 \$0 \$68 \$0 TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD 0222541900 16.00 C.Y. 0.00 1.74 0.67 0.00 2.41 0.09 Unit values \$0 \$28 \$11 \$0 \$39 1.42 Totals TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D 0222582800 210.00 L.F. 0.24 0.47 Unit values 0.01 0.00 0.24 0.00 \$50 \$50 \$0 \$100 Totals 2.10 \$0 CONCRETE PAVING, JOINTS/FINISH, 4500 PSI 0251200400 31.50 S.Y. CONCRETE, 12" THICK 17.52 1.07 1.02 0.00 19.61 Unit values. 0.05 \$34 \$32 \$0 \$618 1.54 \$552 Totals BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR 0260120200 4.50 C.Y. BANK

17-Oct-94		MeansDa	ta for Lot	us		Page
Unit values Totals	0.16 0.72	2.43 \$11	3.37 \$15	1.37 \$6	0.00 \$0	7.17 \$32
0260120500	BEDDING, I	PLACING IN	TRENCH			
Unit values Totals	0.09 0.40	0.00 \$0	1.74 \$8	0.67 \$3	4.50 C 0.00 \$0	2.41 \$11
0266907800	CUT IN VAI	LVES, W/DUC	K TIP GASK	ET, 4" DIA	METER	
Unit values Totals	1.56 1.56	259.60 \$260	35.47 \$35	5.91 \$6	1.00 E 0.00 \$0	a. 300.98 \$301
0268520200	GAS SERVIC	E & DISTRI	B PIPING, PO	ÖLYETHYLEN	E,60-	
Unit values Totals	PSI 2" DIA 0.07 16.08	M COIL SDR 0.75 \$181	1.48	0.00 \$0	240.00 L 0.00 \$0	1.F. 2.23 \$536
0268520550	GAS SERVIC	E&DISTRIB	PIPING, SCH	40 STEEL P		
Unit values Totals	0.11 5.35	AT&WRAP 1"1 1.92 \$96	DIAM 2.96 \$148	0.17 \$9	50.00 L 0.00 \$0	.F. 5.06 \$253

2

\_\_\_\_\_\_

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
U02 SITEWORK	167	\$1,100	\$3,861	\$1,882	\$0	\$6,843
1554510245	HTG INFA-F	D UNT GAS	ELEC IG	N (See Ata	ached for 1	
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		20500.00
1562600137	GAS APPLIA			JBLE DIAPHF		m.
Unit values Totals	TYPE 1-1/4 0.53 0.53	226.00 \$226	12.10 \$12	0.00 \$0	1.00 0.00 \$0	238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$20,500	\$20,738

\_\_\_\_\_\_

Line #	Description	on	,			
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	168	\$1,326	\$3,873	\$1,882	\$20,500	\$27,581
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	. \$0	\$0	
•	ONTINGENC 20.00% 0.00% 10.00%	\$1,326	\$3,873	\$1,882	\$20,500	\$27,581 \$5,516 \$0 \$2,758
JOB TOTAL						\$35,855

\_\_\_\_\_\_\_

Estimate: BLDG 2762 Date:

14-Oct-94

\$0

\$1,882

Description: Project:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date: FORT KNOX, KY

Job #: 94013.02

Location: Sq. footage:

4800.00

City indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub Total U02 SITEWORK \$1,100 \$1,882 \$6,843 167 \$3,861 \$226 \$20,500 \$12 \$0 \$20,738 U15 MECHANICAL 1 \$1,882 \$20,500 LATOT \$1,326 \$3,873 \$27,581 168 SALES TAX 0.00% \$0 0.00% \$0 MATL MARKUP LABOR MARKUP 0.00% \$0

\$3,873

EQUIPT MARKUP 0.00% SUB MARKUP 0.00% TOTAL BEFORE CONTINGENC \$1,326

CONTINGENCY 20.00% BOND 0.00% PROFIT 10.00%

JOB TOTAL

\$35,855

\$27,581

\$5,516

\$2,758

\$0

\$0

\$20,500

Estimate: BLDG 2762 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_\_ Manhours Matl Labor Equipment Sub Total \_\_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 300.00 L.F. Unit values. 0.15 2.22 4.57 0.00 6.79 0.00 Totals 44.70 \$665 \$1,372 \$0 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 20.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 2.98 \$44 \$91 \$0 \$0 \$135 A09 ELECTRICAL \$0

\$709 \$1,463

48

\$0

\$2,172

=======================================			======		=======	========
Line #	Descripti	on		<b>.</b>		
	Manhours			Equipment		
	=======	========	======	========	=======	========
1517010650	BLACK STE W/CPLGS	EL RADIANT	PIPE, S	CHEDULE 40,	THREADED	, 4" DIAM L.F.
Unit values Totals	0.44	4.17 \$1,147	10.30 \$2,833	0.00 \$0	0.00	14.47 \$3,980
1517011310	GAS SERVI	CE PIPE ST	EEL GALV	SCH 40 THRI	0 W/CPLG 0	& HNGR SZD
Unit values Totals	0.13 40.64	1.64 \$525	2.88 \$920	0.00	0.00	4.52 \$1,445
1519010320	ALUMINUM	REFLECTORS	W/HANGE	RS	20.00	n-
Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145	0.00 \$0	38.00 0.00 \$0	43.59 \$1,657
1524105040	VACUUM PU	MP AND VEN	r piping		1.00	Fa
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00 \$0	0.00	858.50 \$858
1552301020 .	GAS FIRED	BURNER 10	0 MBH &	COMBUSTION	CHAMBER 6.00	Fa
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00 \$0	904.06 \$5,424
1554510160	CO RAY-VA	C VANTAGE :	2 INFA-1	RD HTG UNT,	GAS 40MBI 1.00	
Unit values Totals	4.00 4.00	935.00 \$935	81.70 \$82	0.00 \$0	0.00	1016.70 \$1,017
1556800120	CO-RAY-VA	C VANTAGE :	2 VENT P	IPE	1 00	E o
Unit values Totals	1.60 1.60	70.00 \$70	76.50 \$76	0.00 \$0	1.00 0.00 \$0	146.50 \$146
1574205220	ELECTRIC '	THERMOSTAT	W/ COVE	R AND WIRING		
Unit values Totals	1.00	75.00 \$150	27.55 \$55	0.00 \$0	2.00 0.00 \$0	102.55 \$205
U15 MECHANICAL	199	\$10,237	, \$4,495	\$0	\$0	\$14,732

•	$\sim$		$\overline{}$	C	_		$\sim$	
	×	-	<i>(</i> 1	~	-	_	_	л

## MeansData for Lotus

Page 3

=======================================									
Line #	Description	n							
	Manhours	Matl	Labor	Equipment	Sub	Total			
	<b></b>					=======			
1631200100	HEATING SY	STEM POW	ER / CONTR	ROL PANEL		_			
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	1.00 0.00 \$0	Ea. 401.34 \$402			
U16 ELECTRICAL	3	\$331	\$71	40	* •				
OTO PERCHANA	3	422T	<b>⇒</b> /⊥	\$0	\$0	\$402			

	=======		=======	========	=======	=======
Line #	Descripti	.on			•	
=======================================	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%		7 -	\$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	\$0	\$17,306 \$0 \$0 \$0
JOB TOTAL						\$17,306

Estimate:

BLDG 2762 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE

Description: Project:

LIMITED EEAP (GLASSBID Date: FORT KNOX, KY Job #:

Location:

Sq. footage:

Job #: 94013.02 City indx:Louisville, KY

sq. rootage:	: City indx.houisville, ki						
	<u> </u>	UMMARY					
	Manhours	Matl	Labor	Equipment	Sub	Total	
=======================================					•		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	L 199	\$709 \$10,237 \$331	\$1,463 \$4,495 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,172 \$14,732 \$402	
TOTAL -	250	\$11,277	\$6,029	\$0	\$0	\$17,306	
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0		
TOTAL BEFORE CONTINGENCY BOND PROFIT	CONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	\$0	\$17,306 \$0 \$0 \$0	
JOB TOTAL						\$17,306	

			=====-				
	Estimate: Description: Project:	BLDG 2763 COST ESTI	MATE	Date:	14-Oct-94		========
	Project: Location: Sq. footage:	FORT KNOX	, KY	Job #: Citv indx	94013.02 :Louisville	, KY	
		Description					
	==========	Manhours	Matl ======	Labor	Equipment	Sub	Total
	0205543200	SITE REMOV	JAL, STEEL	PIPE, WELI	DED CONNECT		т та
	Unit values	0.15	0.00	3.16	1.29	400.00	Д. F. 4.44
	Totals	60.00	\$0	\$1,262	\$514		\$1,776
	0207183600	HVAC DEMO	MECH EQP'	r heavy in	TEM		
	Unit values	14.55	0.00	380.36	0.00	0.50 0.00	
	Totals	7.27	\$0	\$190	\$0		380.36 \$190
	0208400600	REMOVE PIE	E INSULA	TION UP TC	4" DIAMET	ER PIPE	
:	Unit values	0.07	0.00	1.97	0.24	200.00	
	Totals	14.20	\$0	\$395	\$47		2.21 \$442
	0208401000 -	REMOVE INS	ULATION E	FROM PIPE	FITTING, U	P TO 4"	П-
1	Unit values	0.20	0.00	5.55	0.68	0.00	£а. 6.23
	Totals	20.00	\$0	\$555	\$68		\$623
(	0266907800	CUT IN VAL	VES, W/DU	JCK TIP GA	SKET, 4" DI		
Į	Unit values	1.56	259.60	35 <b>.47</b>	5.91	1.00	Ea. 300.98
	Totals		\$260	\$35			\$300.98 \$301
(	0268520550	GAS SERVIC	E&DISTRIE	PIPING,S	CH40 STEEL	PLAIN	
τ	Jnit values	END, TAR CO	1.92	2 96	0.17	50.00 0.00	Б.F. 5.06
7	<b>Cotals</b>	5.35	\$96	\$148	\$9	\$0	\$253
τ	J02 SITEWORK	109	\$356	<b>୯၁</b> ୮୦୮	Ċ C A A	* ~	<b>40</b>
		100	4220	ŞZ,50 <b>5</b>	\$644	\$0	\$3,585

=======================================	=	=======	=======	========	=======	========
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======	=======	:======	:======:	
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	I (See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		17306.00 \$17,306
1562600137	GAS APPLIA			BLE DIAPHR	AGM	E o
Unit values Totals	TYPE 1-1/4 0.53 0.53	226.00 \$226	12.10 \$12	. 0.00	0.00	238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$17,306	\$17,544

	========	=======	=======			
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======			<b>======</b>	
ESTIMATE TOTAL	110	\$582	\$2,597	\$644	\$17,306	\$21,129
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00% 0.00%	\$0	\$0			
EQUIPT MARKUP	0.00%		φ.	\$0		
SUB MARKUP	0.00%				\$0	
	ONTINGENC	\$582	\$2,597	\$644	\$17,306	\$21,129
CONTINGENCY BOND	10.00% 0.00%					\$2,113 \$0
PROFIT	10.00%					\$2,113
JOB TOTAL						\$25,355

JOB TOTAL

Estimate: Description: Project: Location: Sq. footage:	BLDG 2763 COST ESTIM LIMITED EE FORT KNOX, 4800.00	AP (GLASS	Job #:	14-Oct-94  94013.02 :Louisville	, KY					
	SUMMARY									
	Manhours	Matl	Labor	Equipment	Sub	Total				
=======================================				=======================================	======:	=======				
U02 SITEWORK U15 MECHANICAL	109 1	\$356 \$226	\$2,585 \$12	\$644 \$0	\$0 \$17,306	\$3,585 \$17,544				
TOTAL .	110	\$582	\$2,597	· \$644	\$17,306	\$21,129				
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0					
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$17,306	\$21,129 \$2,113 \$0 \$2,113				

\$25,355

Estimate: BLDG 2763 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: 94013.02 City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 300.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 44.70 Totals \$665 \$1,372 \$0 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 20.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 2.98 \$44 \$91 \$0 \$0 \$135 A09 ELECTRICAL 48 \$709 \$0 \$1,463 \$0 \$2,172

=======================================	========	========	=======	=========	=======	=========
Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================			=======	=======================================	======	========
1517010650	BLACK ST W/CPLGS	EEL RADIANT	PIPE, SC	CHEDULE 40,	THREADED	, 4" DIAM
Unit values Totals	0.44 122.10	4.17 \$1,147	10.30 \$2,833		0.00	14.47
1517011310	GAS SERV	ICE PIPE ST 10'OC 1/2"	EEL GALV	SCH 40 THRE	W/CPLG	& HNGR SZD
Unit values Totals .	0.13 40.64	1.64 \$525	2.88 \$920	. 0.00 \$0	320.00 0.00 \$0	4.52
1519010320	ALUMINUM	REFLECTORS	W/HANGER	S		
Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145	0.00 \$0	38.00 0.00 \$0	Ea. 43.59 \$1,657
1524105040	VACUUM PI	UMP AND VEN	T PIPING			
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00 \$0	1.00 0.00 \$0	Ea. 858.50 \$858
1552301020	GAS FIRE	BURNER 10	0 MBH &	COMBUSTION		
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	6.00 0.00 \$0	Ea. 904.06 \$5,424
1554510160	CO RAY-VA	AC VANTAGE	2 INFA-RI	D HTG UNT,		
Unit values Totals	4.00	935.00 \$935	81.70 \$82	0.00 \$0	1.00 0.00 \$0	Ea. 1016.70 \$1,017
1556800120	CO-RAY-VA	C VANTAGE 2	VENT PI	PE .		
Unit values Totals .	1.60 1.60	70.00 \$70	76.50 \$76	· 0.00 \$0	1.00 0.00 \$0	Ea. 146.50 \$146
1574205220	ELECTRIC	THERMOSTAT	W/ COVER	AND WIRING		
Unit values Totals	1.00	75.00 \$150	27.55 \$55	0.00 \$0	2.00 0.00 \$0	Ea. 102.55 \$205
U15 MECHANICAL	199	\$10,237	\$4,495	\$0	\$0	\$14,732

1	8	-	0	C	t	_	9	4
---	---	---	---	---	---	---	---	---

## MeansData for Lotus

Page 3

=======================================		========	======	========	======:	========
Line #	Descriptio	n			•	
•	Manhours	Matl	Labor	Equipment	Sub	Total
					:	=======
1631200100	HEATING SY	STEM POWE	R / CONT	ROL PANEL	7 00	<b>n</b> -
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	1.00 0.00 \$0	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

=========	========	=======	=======	==========	=======	========
Line #	Descripti	.on				
	Manhours	Matl	Labor	Equipment	Sub	Total
			=======	=======================================		
ESTIMATE TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0	•		•	
LABOR MARKUP EQUIPT MARKUP	0.00%	ΨO	\$0	\$0		
SUB MARKUP	0.00%				\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	\$0	\$17,306 \$0 \$0 \$0
JOB TOTAL						\$17,306

\_\_\_\_\_\_\_

Estimate: BLDG 2763 Date: 14-Oct-94

Description: Project:

JOB TOTAL

INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP (GLASSBID Date: FORT KNOX, KY Job #: 94013.02

Location: Sq. footage:

Job #: 94013.02 City indx:Louisville, KY

Sq. rootage:	City indx:Louisville, ki							
=======================================	S	UMMARY						
	Manhours	Matl	Labor	Equipment	Sub	Total		
				······				
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	48 199 3	\$709 \$10,237 \$331	\$1,463 \$4,495 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,172 \$14,732 \$402		
TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306		
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	4.5			
SUB MARKUP	0.00%		•		\$ <b>o</b>			
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	0.00% 0.00% 0.00% 0.00%	\$11,277	\$6,029	<b>\$</b> 0	\$0	\$17,306 \$0 \$0 \$0		

Estimate: Description:	BLDG 2764 COST ESTI	MATE	Date:	14-Oct-94		
Description: Project: Location: Sq. footage:	4800.00		City indx:	Louisville	, KY	
Line #	Descripti	on			========	========
	Manhours	Matl	Labor .	Equipment	Sub	Total
					======	========
0205543200	SITE REMO	VAL, STEEL		ED CONNECTI		T #1
Unit values <sup>°</sup> Totals	0.15		3.16 \$1,262	1.29 \$514	400.00 0.00 \$0	
0207183600	HVAC DEMO	MECH EQP	T HEAVY IT	EM		
Unit values Totals	14.55 7.27	0.00 \$0	380.36 \$190	0.00 \$0	0.50 0.00 \$0	Ton 380.36 \$190
0208400600	REMOVE PI	PE INSULA	TION UP TO	4" DIAMETE		
Unit values Totals	0.07 14.20	0.00 \$0	1.97 \$395	0.24 \$47	200.00 0.00 \$0	L.F. 2.21 \$442
0208401000	REMOVE INS	SULATION I	FROM PIPE	FITTING, UP	TO 4"	n-
Unit values Totals	0.20	0.00	5.55 \$555	0.68 \$68	100.00 0.00 \$0	6.23 \$623
0266907800	CUT IN VAL	VES, W/DU	JCK TIP GAS	SKET, 4" DI	AMETER .	
Unit values Totals	1.56 1.56	259.60 \$260	35.47 \$35	5.91 \$6	1.00 0.00 \$0	Ea. 300.98 \$301
0268520550	GAS SERVIC	E&DISTRIE	PIPING, SO	CH40 STEEL		
Unit values Totals	END, TAR CO 0.11 5.35	1.92 \$96	2.96 \$148	0.17 \$9	50.00 0.00 \$0	L.F. 5.06 \$253
U02 SITEWORK	109	\$356	\$2,585	\$644	\$0	\$3,585

_=========	========	=======		========		========
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
			=====:	========	=======	=======
1554510245	HTG INFA-R	D UNT GAS	ELEC IG	N (See Att		Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	1.00 17306.00 \$17,306	
1562600137	GAS APPLIA			JBLE DIAPHE		
Unit values Totals	TYPE 1-1/4 0.53 0.53	" PIPE SI2 226.00 \$226	ZE 12.10 \$12	0.00	1.00 0.00 \$0	Ea. 238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$17,306	\$17,544

=======================================	=========		=======	========	=======	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	110	\$582	\$2,597	\$644	\$17,306	\$21,129
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP .	0.00% 0.00%		·	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND	ONTINGENC 10.00% 0.00%	\$582	\$2,597	\$644	\$17,306	\$21,129 \$2,113 \$0
PROFIT	10.00%					\$2,113
JOB TOTAL						\$25,355

\_\_\_\_\_

Estimate: BLDG 2764
Description: COST ESTIMATE

Date:

14-Oct-94

LIMITED EEAP (GLASSBid Date: Project:

Job #:

Location: Location: FORT KNOX, KY
Sq. footage: 4800.00 

City indx:Louisville, KY

	Si	JMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================			======			========
U02 SITEWORK U15 MECHANICAL	109	\$356 \$226	\$2,585 \$12	\$644 \$0	\$0 \$17,306	\$3,585 \$17,544
TOTAL	110	\$582	\$2,597	\$644	\$17,306	\$21,129
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$O	\$0	\$ô	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$6 <b>44</b>	\$17,306	\$21,129 \$2,113 \$0 \$2,113
JOB TOTAL						\$25,355

\$2,172

Estimate: BLDG 2764 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description Labor Equipment Manhours Matl \_\_\_\_\_\_ 0913100200 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES 300.00 L.F. Unit values 0.15 2.22 4.57 0.00 6.79 0.00 Totals 44.70 \$665 \$1,372 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 20.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 2.98 \$44 \$0 \$0 \$91 \$135 A09 ELECTRICAL 48 \$709 \$1,463 \$0 \$0

==========	=======	========	======	========	======	========
Line # ·	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
1517010650	W/CPLGS			CHEDULE 40,	275.00	L.F.
Unit values Totals	0.44 122.10	4.17 \$1,147	10.30 \$2,833	0.00 \$0	0.00 \$0	14.47 \$3,980
1517011310	GAS SERV	ICE PIPE ST	EEL GALV DIAM	SCH 40 THRI	0 W/CPLG	& HNGR SZD
Unit values Totals	0.13 40.64	1.64 \$525	2.88 \$920	0.00 \$0	0.00	4.52 \$1,445
1519010320				RS	38.00	
Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145	0.00 \$0	0.00 \$0	43.59 \$1,657
1524105040	VACUUM PU	JMP AND VEN	r piping		1.00	F.a.
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	. 0.00 \$0	0.00	858.50 \$858
1552301020					6 00	₽°3
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	904.06 \$5,424
1554510160	·				1 00	E-a
Unit values Totals	4.00	935.00 \$935	81.70 \$82	0.00 \$0	0.00	1016.70 \$1,017
1556800120	CO-RAY-VA	AC VANTAGE 2	VENT P	(PE	1.00	Po.
Unit values Totals	1.60 1.60	70.00 \$70	76.50 \$76	0.00 \$0	0.00	146.50
1574205220	ELECTRIC	THERMOSTAT	W/ COVER	R AND WIRING		Tin.
Unit values Totals	1.00	75.00 \$150	27.55 \$55	0.00 \$0	2.00 0.00 \$0	102.55 \$205
U15 MECHANICAL	199	\$10,237	\$4,495	\$0	\$0	\$14,732

- 1	~	_	f 1	~	~	_	<b>u</b>	<b>/</b> 1
1	O	_	v	_	_	_	2	-

## MeansData for Lotus

Page 3

				=========	======				
Line #	Description								
	Manhours	Matl	Labor	Equipment	Sub	Total			
=======================================	========	=======			=====:				
1631200100	HEATING SY	STEM POWE	ER / CONTR	OL PANEL	1.00	Fa			
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402			
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402			

<i> </i>	:=======	=======			=======	=======
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	:===##====	=======	======	=======		*=======
ESTIMATE TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0	40			
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	CONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	<b>\$</b> 0	\$17,306 \$0 \$0 \$0
JOB TOTAL			•			\$17.306

Estimate: BLDG 2764

Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE

Project:

LIMITED EEAP (GLASSBid Date: FORT KNOX, KY

TOTAL BEFORE CONTINGENC \$11,277 \$6,029

0.00%

0.00%

0.00%

Location:

Job #: 94013.02

Sq. footage:

CONTINGENCY

BOND

PROFIT

JOB TOTAL

City indx:Louisville, KY 

\$0

\$0

\$17,306

\$17,306

\$0 \$0

\$0

	Manhours	Matl	Labor	Equipment	Sub	Total
					·	
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	48 199 3	\$709 \$10,237 \$331	\$1,463 \$4,495 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,172 \$14,732 \$402
TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	

Estimate: . BLDG 2765 Date: 14-Oct-94 COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: FORT KNOX, KY Location: Job #: 94013.02 Sq. footage: City indx:Louisville, KY 4800.00 Description Manhours Matl Labor Equipment 0205543200 SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 4"DIAMETER 400.00 L.F. Unit values 0.15 0.00 3.16 1.29 4.44 0.00 Totals 60.00 \$0 \$1,262 \$514 \$0 \$1,776 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 0.50 Ton 0.00 Unit values 14.55 0.00 380.36 0.00 380.36 Totals 7.27 \$0 \$190 \$0 \$0 \$190 0208400600 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 200.00 L.F. 0.07 Unit values. 1.97 0.24 0.00 0.00 2.21 Totals 14.20 \$0 \$395 \$47 \$0 \$442 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 100.00 Ea. Unit values 0.20 0.00 0.68 5.55 0.00 6.23 Totals 20.00 \$0 \$555 \$68 \$0 \$623 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. Unit values 1.56 259.60 35.47 5.91 300.98 0.00 Totals 1.56 \$260 \$6 \$35 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values 0.11 1.92 2.96 0.17 0.00 5.06 Totals 5.35 \$96 \$148 \$9 \$0 \$253 U02 SITEWORK 109 \$2,585 \$356 \$644 \$0 \$3,585

		=======	=======	=======		========
Line #	Description	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
<b>#</b>		=======	=======	=======:	=======	=======
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	N (See Att	tached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	17306.00	
1562600137	GAS APPLIA			JBLE DIAPHI		
Unit values Totals	TYPE 1-1/4 0.53 0.53		ZE 12.10 \$12	0.00 \$0	1.00 0.00 \$0	
U15 MECHANICAL	1	\$226	\$12	\$0	\$17,306	\$17,544

=========				=======================================	=======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
·			ar and also over over one also over and a			
ESTIMATE TOTAL	L 110	\$582	\$2,597	\$644	\$17,306	\$21,129
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	·	<b>71</b> ,7500	Y21,123
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE ( CONTINGENCY BOND PROFIT	CONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$17,306	\$21,129 \$2,113 \$0 \$2,113
JOB TOTAL						\$25,355

\$25,355

Estimate: BLDG 2765 Date:
Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBID Date:

Date: 14-Oct-94

Project: Location:
Sq. footage:

FORT KNOX, KY Job #: 94013.02 4800.00 City indx:Louisville.

JOB TOTAL

Sq. footage:	4800.00		City indx	:Louisville	, KY 	
=======================================	Si	JMMARY			•	
	Manhours	Matl	Labor	Equipment	Sub	Total
U02 SITEWORK U15 MECHANICAL	109 1	\$356 \$226	\$2,585 \$12	\$644 \$0	\$0 \$17,306	\$3,585 \$17,544
TOTAL	110	\$582	\$2,597	\$644	\$17,306	\$21,129
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$17,306	\$21,129 \$2,113 \$0 \$2,113

Estimate: ' BLDG 2765 Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Location: Job #: Sq. footage: City indx:Louisville, KY Description Manhours Matl Labor Equipment 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 300.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 44.70 \$665 \$1,372 \$0 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 20.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 2.98 \$44 \$91 \$0 \$0 \$135 A09 ELECTRICAL 48 \$1,463 \$709 \$0 \$0 \$2,172

\_\_\_\_\_\_\_

Line #	Descripti	on				
	Manhours	Matl	Labor	Equipmer	it Sub	Total
	=========	:===========	======		: = = = = = <del>=</del> = = = :	
1517010650	W/CPLGS				0, THREADEI	O, 4" DIAM O L.F.
Unit values Totals	0.44	4.17 \$1,147	10.30 \$2,833	0.0		14.47
1517011310 -	GAS SERVI	CE PIPE STI 10'OC 1/2"	DTAM		320 00	& HNGR SZD
Unit values Totals	0.13 40.64	1.64 \$525	2.88	0.0	0.00	
1519010320	ALUMINUM	REFLECTORS	W/HANGE	RS	20.00	<b>.</b> ≒.
Unit values Totals		39.79 \$1,512			0.00	Ea. 3.59 31,657
1524105040	VACUUM PU	MP AND VENT	r PIPING	<del>}</del>	1 00	) Ea.
Unit values Totals	3.00 3.00	738.35 \$738		0.0	0.00	
1552301020	GAS FIRED	BURNER 100	MBH &	COMBUSTI		\ <b></b>
Unit values Totals		860.00 \$5,160			0.00	
1554510160	CO RAY-VA	.C VANTAGE 2	INFA-	RD HTG UN		BH DEa.
Unit values Totals			81.70 \$82		0.00	
1556800120	CO-RAY-VA	C VANTAGE 2	VENT P	IPE	1 00	
Unit values Totals	1.60 1.60	70.00 \$70	76.50 \$76		0 0.00	
1574205220	ELECTRIC	THERMOSTAT	W/ COVE	R AND WIR		_
Unit values Totals	1.00	75.00 \$150	27.55 \$55			
U15 MECHANICAL	199	\$10,237	\$4,495	\$	0 \$0	\$14,732

=======================================		======:	=======		======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
					======	=======
1631200100	HEATING SY	STEM POWE	ER / CONT	ROL PANEL		
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	1.00 0.00 \$0	Ea. 401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

==========			=======		=======	
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306
SALES TAX MATL MARKUP. LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	·		
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%		,	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	\$0	\$17,306 \$0 \$0 \$0
JOB TOTAL						\$17,306

Estimate:

BLDG 2765 Date:

14-Oct-94

Description:

INFRARED HEATING SYSTEM COST ESTIMATE

Project: Location:

JOB TOTAL

LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY

Job #:

Sq. footage:

City indx:Louisville, KY

:	SUMMARY				========	=======
	Manhours	Matl	Labor	Equipment	Sub	Total
						======
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	48 199 3	\$709 \$10,237 \$331	\$1,463 \$4,495 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,172 \$14,732 \$402
TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	٠	
SUB MARKUP	0.00%			* -	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	\$0	\$17,306 \$0 \$0 \$0 \$0

BLDG 2766 Date: 14-Oct-94 COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: City indx:Louisville, KY 4800.00 Sq. footage: Description Manhours Matl Labor Equipment SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 4"DIAMETER 400.00 L.F. Unit values 0.15 0.00 3.16 1.29 0.00 4.44 Totals 60.00 \$0 \$1,262 \$514 \$0 \$1,776 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 0.50 Ton Unit values 14.55 0.00 380.36 0.00 0.00 380.36 Totals 7.27 \$0 \$190 \$0 \$0 \$190 0208400600 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 200.00 L.F. Unit values 0.00 1.97 0.07 0.24 0.00 2.21 Totals \$395 14.20 \$0 \$47 \$0 \$442 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 100.00 Ea. Unit values 0.20 0.00 5.55 0.68 0.00 6.23 Totals 20.00 \$0 \$555 \$68 \$Ò \$623 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. Unit values 259.60 300.98 1.56 35.47 5.91 0.00 Totals 1.56 \$260 \$35 \$6 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values 0.11 1.92 2.96 0.17 0.00 5.06 Totals 5.35 \$96 \$148 \$9 \$0 \$253 U02 SITEWORK 109 \$356 \$2,585 \$644 \$0 \$3,585

J=============	========	=======	=======			=======
Line #	Description	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	N (See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	17306.00	
1562600137	GAS APPLIA			JBLE DIAPHE		_
Unit values Totals	TYPE 1-1/4 0.53 0.53		ZE 12.10 \$12	0.00 \$0	1.00 0.00 \$0	Ea. 238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$17 306	\$17 544

==========	========	=======	=======	========	=======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================					=======	=======
ESTIMATE TOTAL	110	\$582	\$2,597	\$644	\$17,306	\$21,129
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	•.		
EQUIPT MARKUP SUB MARKUP	0.00%		ŞU	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$17,306	\$21,129 \$2,113 \$0 \$2,113
JOB TOTAL						\$25,355

\_\_\_\_\_\_\_ Estimate: BLDG 2766 Date: 14-Oct-94

Description: Project:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date: FORT KNOX, KY

Job #:

Sq. footage:

Location:

JOB TOTAL

4800.00

City indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ 109 \$356 \$644 \$0 \$3,585 U02 SITEWORK \$2,585 U15 MECHANICAL \$226 \$17,306 1 \$12 \$0 \$17,544 TOTAL 110 \$582 \$2,597 \$644 \$17,306 \$21,129 SALES TAX 0.00% \$0 MATL MARKUP 0.00% \$0 LABOR MARKUP 0.00% \$0 EQUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% \$0 TOTAL BEFORE CONTINGENC \$582 \$2,597 \$644 \$17,306 \$21,129 CONTINGENCY 10.00% \$2,113 BOND 0.00% \$0 PROFIT 10.00% \$2,113

\$25,355

A09 ELECTRICAL

48

\_\_\_\_\_\_ Estimate: BLDG 2766 Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE Project: LIMITED EEAP(GLASSBid Date: FORT KNOX, KY Job #: 94013.02 Location: City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_ \_\_\_\_\_. Manhours Matl Labor Equipment \_\_\_\_\_\_ 0913100200 -115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES 300.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 44.70 Totals \$665 \$1,372 \$0 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 20.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 2.98 \$0 \$44 \$91 \$0 \$135

\$1,463

\$0

\$0

\$2,172

\$709

Line # .	Descripti	on				
	Manhours		Labor		Sub	Total
=======================================	========		======		======	
•						
1517010650	BLACK STE W/CPLGS	EL RADIANT	PIPE, S	SCHEDULE 40,		, 4" DIAM L.F.
Unit values	0.44	4.17	10.30	0.00	0.00	14.47
Totals	122.10	\$1,147	\$2,833	\$ \$0	\$0	\$3,980
1517011310		CE PIPE STI 10'OC 1/2"	DIAM		320 00	
Unit values	0.13	1.64	2.88	0.00	0.00	4.52
Totals	40.64	\$525	\$920	\$0	\$0	\$1,445
1519010320	ALUMINUM	REFLECTORS	W/HANGE	ERS		
Unit values	0.50	39.79	3.80	0.00	38.00 0.00	
Totals	19.00	\$1,512				\$1,657
1504105040	113 GITTM 1011		•		·	
1524105040	VACUUM PU	MP AND VEN	I. PIPING	<del>)</del>	1.00	Ea.
Unit_values	3.00	738.35		0.00	0.00	858.50
Totals	3.00	\$738	\$120	) · \$0	\$0	\$858
1552301020	GAS FIRED	BURNER 100	MBH 6	COMBUSTION	CHAMBER 6.00	Ea.
Unit_values	1.00	860.00	44.06	0.00	0.00	904.06
Totals	6.00	\$5,160	\$264	\$0	\$0	\$5,424
1554510160	CO RAY-VA	C VANTAGE 2	2 INFA-	RD HTG UNT,	GAS 40MB	
Unit values	4.00			0.00	0.00	1016.70
Totals	4.00	\$935	\$82	\$0	\$0	\$1,017
1556800120	CO-RAY-VA	C VANTAGE 2	2 VENT P	PIPE	1.00	Ea
Unit values Totals	1.60 1.60	70.00 \$70	76.50 \$76	0.00		146.50 \$146
		:	•	·	•	Ų110
1574205220	ELECTRIC '	THERMOSTAT	W/ COVE	ER AND WIRING	2.00	E a
Unit values	1.00	75.00	27.55	0.00	0.00	102.55
Totals	2.00	\$150	\$55		\$0	\$205
U15 MECHANICAL	199	\$10,237	\$4,495	\$0	\$0	\$14,732

_======================================		=======	=======	=========	======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
		:			======	
1631,200100	HEATING S	YSTEM POWI	ER / CONTI	ROL PANEL		
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	1.00 0.00 \$0	Ea. 401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	· \$0	\$0	\$402

JOB TOTAL

\$17,306

\_\_\_\_\_ Line # Description Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ \$11,277 \$6,029 \$0 \$0 250 \$17,306 ESTIMATE TOTAL 0.00% \$0 SALES TAX \$0 MATL MARKUP 0.00% 0.00% \$0 LABOR MARKUP EQUIPT MARKUP 0.00% \$0 \$0 SUB MARKUP 0.00% TOTAL BEFORE CONTINGENC \$0 \$17,306 \$11,277 \$6,029 \$0 0.00% CONTINGENCY \$0 \$0 0.00% BOND \$0 PROFIT 0.00%

\_\_\_\_\_\_\_ Estimate: BLDG 2766 Date: 14-Oct-94

Description:

INFRARED HEATING SYSTEM COST ESTIMATE

Project:

LIMITED EEAP(GLASSBid Date: FORT KNOX, KY

Location: Sq. footage:

JOB TOTAL

Job #: 94013.02 City indx:Louisville,

Sq. footage:	City indx:Louisville, Ki						
=======================================	SUMMARY						
	Manhours	Matl	Labor	Equipment	Sub	Total	
========							
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	48 199 3	\$709 \$10,237 \$331	\$1,463 \$4,495 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,172 \$14,732 \$402	
TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306	
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0				
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0		
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	\$0	\$17,306 \$0 \$0 \$0	

Estimate: Description:	BLDG 2767	===== ; re	====== Date:	14-Oct-94	======	========
Project: Location: Sq. footage:	FORT KNOX, I	(Y	Job #: City indx	94013.02 :Louisville,		~=======
Line #	Description					
	Manhours N	Matl		Equipment	Sub	Total
	SITE REMOVAI 4"DIAMETER					L.F.
Unit values Totals	0.15 60.00	0.00 \$0	3.16 \$1,262	1.29 \$514	0.00	4.44
0207183600	HVAC DEMO, ME	ECH EQP	r heavy i	rem		_
Unit values Totals	14.55 7.27	0.00 \$0	380.36 \$190	0.00 \$0	0.50 0.00 \$0	Ton 380.36 \$190
0208400600	REMOVE PIPE	INSULA'	TION UP TO	O 4" DIAMETE		T. 17
Unit values Totals	0.07 14.20	0.00 \$0	1.97 \$395	0.24 . \$47	0.00	2.21 \$442
	REMOVE INSUI	ATION I	FROM PIPE	FITTING, UP	TO 4"	Ea.
Unit values Totals	0.20 20.00	0.00 \$0	5.55 \$555	0.68 \$68	0.00 \$0	6.23 \$623
0266907800	CUT IN VALVE	s, W/D			7 00	E.
Unit values Totals	1.56 2 1.56	\$59.60 \$260	35. <b>4</b> 7 \$35	5.91 \$6	1.00 0.00 \$0	300.98 \$301
0268520550	GAS SERVICES	DISTRIE	B PIPING,S	SCH40 STEEL	PLAIN	· I. F
Unit values Totals	END, TAR COAT 0.11 5.35	1.92 \$96	2.96 \$148	0.17 \$9	0.00	5.06 \$253
U02 SITEWORK	109	\$356	\$2,585	\$644	\$0	\$3,585

=======================================	========	=======		========	========	========
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	N (See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	17306.00	
1562600137	GAS APPLIA TYPE 1-1/4			JBLE DIAPHI	RAGM 1.00	Ea
Unit values Totals .	0.53		12.10	. 0.00 \$0		
U15 MECHANICAL	1	\$226	\$12	\$0	\$17,306	\$17,544

=========				=========	========	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
==========	========		=======		========	======
ESTIMATE TOTAL	110	\$582	\$2,597	\$644	\$17,306	\$21,129
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		Şυ	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$17,306	\$21,129 \$2,113 \$0 \$2,113
JOB TOTAL						\$25,355

\_\_\_\_\_\_\_

Estimate: BLDG 2767 Date: 14-Oct-94

0.00%

10.00%

0.00%

Description: Project:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY Job #:

94013.02

\$644

Location: Sq. footage:

SUB MARKUP

CONTINGENCY

BOND

TOTAL BEFORE CONTINGENC

4800.00

City indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub Total \_\_\_\_\_\_ U02 SITEWORK \$2,585 \$644 \$3,585 109 \$356 \$0 \$12 \$0 \$17,306 \$17,544 U15 MECHANICAL 1 \$226 TOTAL 110 \$582 \$2,597 \$644 \$17,306 \$21,129 SALES TAX 0.00% \$0 MATL MARKUP 0.00% \$0 0.00% \$0 LABOR MARKUP EQUIPT MARKUP 0.00% \$0

PROFIT 10.00% \$2,113 JOB TOTAL \$25,355

\$582 \$2,597

\$0

\$21,129

\$2,113

\$0

A09 ELECTRICAL

\_\_\_\_\_ Estimate: BLDG 2767 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: . City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_ \_\_\_\_\_\_ Manhours Matl Labor Equipment \_\_\_\_\_\_ 0913100200 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES 300.00 L.F. 0.00 6.79 Unit values 0.15 2.22 4.57 0.00 44.70 \$665 Totals \$1,372 \$0 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES
0.15 2.22 4.57 0.00 20.00 L.F. 0.00 6.79 Unit values \$0 2.98 \$44 \$91 \$0 \$135 Totals

\$1,463

\$0

\$0

\$2,172

\$709

48

=============	========	=======	=======		=======	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=========	:=======	======	========	:====:	========
1517010650	_ /			CHEDULE 40,	275 22	, 4" DIAM L.F.
Unit values Totals	0.44	4.17 \$1,147	10.30 \$2,833	0.00 \$0	0.00	14.47 \$3,980
1517011310	GAS SERVIC	CE PIPE ST	EEL GALV	SCH 40 THRI	W/CPLG	& HNGR SZD
Unit values Totals	0.13 40.64	1.64 \$525	2.88 \$920	0.00	0.00	4.52 \$1,445
1519010320	ALUMINUM F	REFLECTORS	W/HANGE	RS	39 00	Pa
1519010320 Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145	0.00 \$0	0.00	43.59 \$1,657
1524105040	VACUUM PUN	IP AND VEN	T PIPING		1.00	Ea
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00 \$0	0.00	858.50
1552301020	GAS FIRED	BURNER 10	0 MBH &	COMBUSTION	CHAMBER	Ea.
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	904.06
1554510160	CO RAY-VAC	C VANTAGE	2 INFA-	RD HTG UNT,	GAS 40MB	H Fa
Unit values Totals	4.00 4.00	935.00 \$935	81.70 \$82	0.00 \$0	0.00	1016.70
1556800120	CO-RAY-VAC	C VANTAGE	2 VENT P	IPE	1 00	Ea.
Unit values Totals	1.60 1.60	70.00 \$70	76.50 \$76	. 0.00 \$0		146.50 \$146
1574205220	ELECTRIC T	THERMOSTAT	W/ COVE	R AND WIRING	3 2.00	F-2
Unit values Totals	1.00	75.00 \$150	27.55 \$55	0.00 \$0	0.00	102.55 \$205
U15 MECHANICAL	199	\$10,237	\$4,495	\$0	\$0	\$14,732

			======		=======	
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======	=======				
1631200100	HEATING S	YSTEM POW	er / cont	ROL PANEL	1 00	n-
Unit values	2.96	330.76	70.58		1.00	401.34
Totals	2.96	\$331	\$71	\$0	\$0	\$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

JOB TOTAL

\$17,306

\_\_\_\_\_\_\_ Description Matl Labor Equipment Manhours \_\_\_\_\_\_\_ \$6,029 ESTIMATE TOTAL 250 \$11,277 \$0 \$0 \$17,306 \$0 SALES TAX 0.00% \$0 MATL MARKUP 0.00% \$0 0.00% LABOR MARKUP \$0 EQUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% TOTAL BEFORE CONTINGENC \$6,029 \$0 \$0 \$17,306 \$11,277 CONTINGENCY 0.00% \$0 \$0 BOND 0.00% \$0 PROFIT 0.00%

Estimate: BLDG 2767

Description: Project: BLDG 2767 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP(GLASSBid Date:

Location: . FORT KNOX, KY

Sq. footage:

Job #: 94013.02 City indx:Louisville, KY

sq. rootage:	: City indx:Louisville, KY					
	S	UMMARY				======
	Manhours	Matl	Labor	Equipment	Sub	Total
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	199	\$709 \$10,237 \$331	\$1,463 \$4,495 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,172 \$14,732 \$402
TOTAL	250	\$11,277	\$6,029	\$0	\$0	\$17,306
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	**		
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$11,277	\$6,029	\$0	\$0	\$17,306 \$0 \$0 \$0
JOB TOTAL						\$17,306

BLDG 2778 Date: 14-Oct-94 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: \*\*\*\*\* City indx:Louisville, KY Sq. footage: Description Line # Manhours Equipment Matl Labor \_\_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 900.00 L.F. 4"DIAMETER 0.15 0.00 3.16 1.29 0.00 4.44 Unit values, Totals 135.00 \$0 \$2,840 \$1,157 \$0 \$3,997 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 5.00 Ton 14.55 0.00 380.36 0.00 0.00 380.36 Unit values \$0 Totals 72.73 \$0 \$1,902 \$0 \$1,902 0208400600 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 900.00 L.F. Unit values 0.07 0.00 1.97 0.24 0.00 2.21 Totals 63.90 \$0 \$1,776 \$213 \$0 \$1,989 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 150.00 Ea. 0.68 6.23 Unit values 0.20 0.00 5.55 0.00 \$833 Totals \$0 \$0 30.00 \$102 \$935 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. 259.60 35.47 5.91 0.00 300.98 Unit values 1.56 Totals 1.56 \$260 \$35 \$6 \$0 \$301 0268520600 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 2"DIAM 150.00 L.F. Unit values. 0.11 2.19 3.18 0.19 0.00 5.55 17.10 \$328 \$476 \$28 \$0 Totals \$832 U02 SITEWORK 321 \$588 \$7,862 \$1,506 \$0 \$9,956

Line #	Descriptio	n					
,	Manhours	Matl	Labor	Equipment	Sub	Total	
=======================================	-2						
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	I (See At	tached for	r Breakdown LS	
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	134504.00		
1562600139	GAS APPLIA	NCE REGUL PE SIZE	ATORS DOU	BLE DIAPHE	RAGM 1.00	Ea.	
Unit values Totals	0.73 0.73	420.00 \$420	16.42 \$16	0.00 \$0	0.00	436.42 \$436	
U15 MECHANICAL	1	\$420	\$16	\$0	\$134,504	\$134,940	

	========	========			========	========
Line #	Description	on			<b></b>	
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======================================	= = = = = = = = = =	=======	= = = = = = = = = =		
ESTIMATE TOTAL	322	\$1,008	\$7,878	\$1,506	\$134,504	\$144,896
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	40	•	
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND	ONTINGENC 10.00% 0.00%	\$1,008	\$7,878	\$1,506	\$134,504	\$144,896 \$14,490 \$0
PROFIT	10.00%					\$14,490
JOB TOTAL						\$173,875

Estimate: BLDG 2778
Description: COST ESTIMATE

Date: 14-Oct-94

Project:

LIMITED EEAP(GLASSBid Date:

94013.02

Location: Sq. footage:

FORT KNOX, KY Job #: \*\*\*\*\*\*\*\* City in

Sq. footage: \*\*\*\*\*\* City indx:Louisville, KY

	SUMMARY
--	---------

	5	UMMARI				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======	=======	======	======	=======	=======
U02 SITEWORK U15 MECHANICAL	321 1	\$588 \$420	\$7,862 \$16	\$1,506 \$0	\$0 \$134,504	\$9,956 \$134,940
TOTAL	322	\$1,008	\$7,878	\$1,506	\$134,504	\$144,896
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,008	\$7,878	\$1,506	\$134,504	\$144,896 \$14,490 \$0 \$14,490
JOB TOTAL				•		\$173,875

Totals

375.48

A09 ELECTRICAL 376 \$5,583

Estimate: BLDG 2778 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02 City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_ Labor Equipment Sub Manhours Matl \_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 2520.00 L.F. 2.22 Unit values 0.15 4.57 0.00 0.00 6.79

\$11,523

\$11,523

\$0

\$0

\$0

\$0

\$17,106

\$17,106

\$5,583

Line #	Descript	ion				
	Manhours			Equipment		Total
	=======	=======	======		======	========
1517010650	BLACK ST	EEL RADIANT	PIPE, S	CHEDULE 40,	THREADED 2520.00	, 4" DIAM
Unit values Totals	0.44	4.17 \$10,508	10.30 \$25,962	0.00 \$0	0.00	
1517011310	GAS SERV	ICE PIPE ST	EEL GALV	SCH 40 THRE	W/CPLG 2500.00	
Unit values Totals	0.13 317.50	10'OC 1/2" 1.64 \$4,100	2.88 \$7,189	0.00 \$0	0.00	4.52 \$11,289
1519010320	ALUMINUM	REFLECTORS	W/HANGE	RS	353.00	<b>n</b> -
Unit values Totals	0.50 176.00	39.79 \$14,006	3.80 \$1,339	0.00 \$0	352.00 0.00 \$0	43.59 \$15,345
1524105040	VACUUM PI	JMP AND VEN	T PIPING			_
Unit values Totals	3.00 24.00	738.35 \$5,907	120.15 \$961	0.00 \$0	8.00 0.00 \$0	858.50 \$6,868
1552301020	CRV-100 (	GAS FIRED B	URNER 10	0 MBH & COM		
Unit values Totals	1.00 48.00	860.00 \$41,280	44.06 \$2,115			
1574205220	ELECTRIC	THERMOSTAT	W/ COVE	R AND WIRING		П-
Unit values Totals	1.00	75.00 \$600	27.55 \$220		8.00 0.00 \$0	102.55
U15 MECHANICAL	1693	\$76,401	\$37,786	\$0	\$0	\$114,187

/								
Line #	Description	on						
	Manhours	Matl	Labor	Equipment	Sub	Total		
	=======	=======	======					
1631200100	HEATING S	STEM POWE	ER / CONTI	ROL PANEL	0.00	<b>n</b> -		
Unit values Totals	2.96 23.70	330.76 \$2,646	70.58 \$565	0.00 \$0	8.00 0.00 \$0	401.34 \$3,211		
U16 ELECTRICAL	24	\$2,646	\$565	\$0	\$0	\$3,211		

=========	=======	=======	=======	=========	=======	=======
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
						*======
ESTIMATE TOTAL	2093	\$84,630	\$49,874	\$0	\$0	\$134,504
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0				
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$84,630	\$49,874	\$0	\$0	\$134,504 \$0 \$0 \$0
JOB .TOTAL						\$134,504

Estimate: BLDG 2778 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:

Project: Location:

FORT KNOX, KY

Sq. footage:

Job #: 94013.02 City indx:Louisville, KY

OTTMANA TO SZ

	S	UMMARY		·		
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======:	========	=======================================	========
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL		\$5,583 \$76,401 \$2,646	\$11,523 \$37,786 \$565	\$0 \$0 . \$0	\$0 \$0 \$0	\$17,106 \$114,187 \$3,211
TOTAL	2093	\$84,630	\$49,874	\$0	\$0	\$134,504
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		·	\$0	\$0	
TOTAL BEFORE COCONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$84,630	\$49,874	\$0	\$0	\$134,504 \$0 \$0 \$0
JOB TOTAL						\$134,504

U02 SITEWORK

150

\$0

\$3,874

\$296

\_\_\_\_\_\_ BLDG 2780 Date: 06-Aug-94 Estimate: COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Boatwright Blr PlaCity indx:Louisville, KY Location: Sq. footage: Description Equipment Manhours Matl Labor SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 4"DIAMETER 150.00 L.F. 3.16 0.00 Unit values 0.15 0.00 1.29 4.44 Totals 22.50 \$0 \$473 \$193 \$0 \$666 0207180380 HVAC DEMO, BOILER GAS/OIL STL >150MBH 2.00 Ea. 323.82 Unit values 12.00 0.00 323.82 0.00 0.00 Totals \$0 \$0 24.00 \$0 \$648 \$648 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 5.00 Ton 0.00 Unit values 14.55 0.00 380.36 0.00 380.36 \$0 \$0 \$1,902 Totals 72.73 \$0 \$1,902 0208400600 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 150.00 L.F. Unit values 0.07 0.00 1.97 0.24 0.00 Totals \$0 \$296 \$35 \$0 \$331 10.65 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 100.00 Ea. 0.00 0.20 0.68 0.00 6.23 Unit values 5.55 Totals 20.00 \$0 \$555 \$0 \$623 \$68

\$4,170

\$0

Line #	Description	on		,					
	Manhours	Matl	Labor	Equipment	Sub	Total			
ESTIMATE TOTAL	150	\$0	\$3,874	\$296	\$0	\$4,170			
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	40					
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			. \$0	\$0				
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$0	\$3,874	\$296	\$0	\$4,170 \$417 \$0 \$417			
JOB TOTAL						\$5,004			

\$5,004

Estimate:

06-Aug-94

Description:

Project: Location:

JOB TOTAL

BLDG 2780 Date: COST ESTIMATE LIMITED EEAP(GLASSBID Date:

Sq. footage:

FORT KNOX, KY Job #: 94013.02 Boatwright Blr PlaCity indx:Louisville, KY

========	SU	JMMARY		=========	======:	=======
·	Manhours	Matl	Labor	Equipment	Sub	Total
					========	======
U02 SITEWORK	150	\$0	\$3,874	\$296	\$0	\$4,170
TOTAL	150	\$0	\$3,874	\$296	\$0	\$4,170
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0				
LABOR MARKUP EQUIPT MARKUP	0.00%	Ψ0	\$0	\$0		
SUB MARKUP	0.00%			γo	\$0	
TOTAL BEFORE CONTINGENCY	CONTINGENC 10.00%	\$0	\$3,874	\$296	\$0	\$4,170 \$417
BOND PROFIT	0.00% 10.00%			•		\$117 \$0 \$417

\_\_\_\_\_\_ BLDG 2781 Date: 14-Oct-94 Description: COST ESTIMATE LIMITED EEAP (GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: \*\*\*\*\* City indx:Louisville, KY Sq. footage: Description Equipment Matl Labor Manhours \_\_\_\_\_\_ PAVEMENT REMOVAL, BITUMINOUS, 4" TO 6" THICK 0205541750 28.00 S.Y. Unit values 0.00 2.09 3.02 0.00 5.11 0.10 \$85 Totals 2.66 \$0 \$58 \$0 \$143 0205542200 SITE DEMOLITION, PAVEMENT, CONCRETE, TO 24 "THICK, REINFORCED 22.00 C.Y. Unit values 92.52 4.21 0.00 133.64 0.00 226.16 Totals \$0 \$2,940 \$0 92.64 \$2,035 \$4,975 0205543200 SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 4"DIAMETER 1000.00 L.F. 1.29 Unit values 0.15 0.00 3.16 0.00 4.44 Totals 150.00 \$0 \$3,156 \$1,285 \$0 \$4,441 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 1.00 Ton 380.36 Unit values 14.55 0.00 380.36 0.00 0.00 · \$0 \$380 \$0 Totals 14.55 \$0 \$380 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 1000.00 L.F. Unit values 0.07 0.00 1.97 0.24 0.00 2.21 Totals 71.00 \$0 \$1,974 \$236 \$0 \$2,210 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 150.00 Ea. Unit values 0.20 0.00 0.68 5.55 0.00 6.23 \$833 Totals 30.00 \$0 \$102 \$0 \$935 0222541900 TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD 26.00 C.Y. Unit values 0.00 1.74 0.09 0.67 0.00 2.41 Totals 2.31 \$0 \$45 \$17 \$0 \$62 0222582800 TRENCH EXCVING 40HP CHNTRNCHR&BKFL 12"W24"D 350.00 L.F. Unit values 0.01 0.00 0.24 0.24 0.00 0.47 3.50 Totals \$0 \$0 \$83 \$83 \$166 0251040380 ASPHALTIC CONCRETE PAVEMENT, PAVING, WEARING

17-Oct-94		MeansDa	ta for Lot	us	•	Page 2
Unit values Totals .	COURSE, 2" 0.02 0.42	THICK 1.90 \$53	0.33 \$9	0.30	28.00 0.00 \$0	
0251200400 Unit values Totals	CONCRETE, 0.05	12" THICK 17.52	1.07		22.00 0.00	S.Y. 19.61 \$432
0260120200 Unit values Totals	BEDDING, F BANK 0.16 1.12	2.43	3.37	·	7.00 0.00 \$0	7.17
0260120500 Unit values Totals	0.09 0.62			0.67 \$5	0.00	C.Y. 2.41 \$17
0266907800 Unit values Totals	1.56				METER 1.00 0.00 \$0	
0268520200 Unit values Totals	PSI 2" DIAI 0.07	M COIL SDR 0.75	11 1.48	OLYETHYLEN 0.00 \$0	375.00 0.00	2.23
0268520600 Unit values Totals	GAS SERVICE END, TAR CON 0.11 5.70	E&DISTRIB AT&WRAP 2" 2.19 \$109	PIPING,SCH DIAM 3.18 \$159	40 STEEL P. 0.19 \$9	50.00 0.00 \$0	5.55

Line #	Descriptio	n				
	Manhours	Matl	Labor I	Equipment	Sub	Total
	========	=======	=======	=======	=======	=======
U02 SITEWORK	403	\$1,107	\$9,382	\$4,808	\$0	\$15,297
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See At	tached for	r Breakdown
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	51359.00	51359.00 \$51,359
1562600137 .	GAS APPLIA			BLĖ DIAPHR		_
Unit values Totals	TYPE 1-1/4 0.53 0.53		12.10 \$12	0.00 \$0	1.00 0.00 \$0	238.10 \$238
1562600139	GAS APPLIA		ATORS DOUB	BLE DIAPHR		<b>n</b> -
Unit values Totals	TYPE 2" PI 0.73 0.73	PE SIZE 420.00 \$420	16.42 \$16	0.00 \$0	1.00 0.00 \$0	436.42 \$436
U15 MECHANICAL	2	\$646	\$28	\$0	\$51,359	\$52,033

==========	========				=======	=======
Line #	Description	on		•		
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	405	\$1,753	\$9,410	\$4,808	\$51,359	\$67,330
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0				
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,753	\$9,410	\$4,808	\$51,359	\$67,330 \$6,733 \$0 \$6,733
JOB TOTAL			•		•	\$80,796

Estimate: BLDG 2781

Date: 14-Oct-94

Description: Project:

COST ESTIMATE

LIMITED EEAP (GLASSBid Date:

FORT KNOX, KY

Job #:

94013.02

Location: Sq. footage:

JOB TOTAL

\*\*\*\*\*

City indx:Louisville, KY

SUMMARY Matl Manhours Labor Equipment Sub \_\_\_\_\_\_ U02 SITEWORK 403 \$1,107 \$9,382 ·\$4,808 \$0 \$15,297 \$0 U15 MECHANICAL \$646 \$28 \$51,359 \$52,033 TOTAL 405 \$1,753 \$9,410 \$4,808 \$51,359 \$67,330 SALES TAX 0.00% \$0 MATL MARKUP 0.00% \$0 LABOR MARKUP 0.00% \$0 EQUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% \$0 TOTAL BEFORE CONTINGENC \$1,753 \$9,410 \$4,808 \$51,359 \$67,330 CONTINGENCY 10.00% \$6,733 BOND 0.00% \$0 PROFIT 10.00% \$6,733

\$80,796

Estimate: . BLDG 2781 Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE Project: LIMITED EEAP (GLASSBid Date: Location: FORT KNOX, KY Job #: 94013.02 City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_ Manhours Matl Labor Equipment Sub \_\_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 910.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 Totals 135.59 \$2,016 \$4,161 \$0 \$0 \$6,177 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 20.00 L.F. 0.15 Unit values 2.22 4.57 0.00 0.00 6.79 Totals 2.98 \$44 \$91 \$0 \$0 \$135 A09 ELECTRICAL 139 \$4,252 \$2,060 \$0 \$0 \$6,312

=======================================	=======	=======	========	=========		
Line #	Descript	ion				
	Manhours		Labor	Equipment	Sub	Total
===========		=======		========	======	=======
1517010650	BLACK ST W/CPLGS	EEL RADIAN	r PIPE, SC	CHEDULE 40,	THREADED 910.00	, 4" DIAM
Unit values Totals		4.17 \$3,795	10.30 \$9,375	0.00 \$0	0.00 \$0	
1517011310	GAS SERV	ICE PIPE ST	TEEL GALV	SCH 40 THR	O W/CPLG	& HNGR SZD
Unit values Totals	0.13 118.11	10'OC 1/2' 1.64 \$1,525	2.88 \$2,674	0.00 \$0	930.00 0.00 \$0	
1519010320	ALUMINUM	REFLECTORS	W/HANGER	.S		
Unit values Totals		39.79 \$5,252	3.80 \$502		132.00 0.00 \$0	Ea. 43.59 \$5,754
1524105040	VACUUM PI	UMP AND VEN	T PIPING			
Unit values Totals	3.00 9.00	738.35 \$2,215	120.15 \$360	0.00 \$0		Ea. 858.50 \$2,575
1552301020	GAS FIRE	D BURNER 10	0 MBH &	COMBUSTION	CHAMBER	
Unit values Totals	1.00 18.00	860.00 \$15,480		0.00 \$0	18.00 0.00 \$0	904.06
1554510160	CO RAY-VA	AC VANTAGE	2 INFA-R	D HTG UNT,	GAS 40MBH	I
Unit values Totals	4.00 4.00	935.00 \$935	81.70 \$82	0.00 \$0	1.00 0.00 \$0	Ea. 1016.70 \$1,017
1556800120 .	CO-RAY-VA	AC VANTAGE	2 VENT PI			
Unit values Totals	1.60 1.60	70.00 \$70	76.50 \$76	0.00 \$0	1.00 0.00 \$0	Ea. 146.50 \$146
1574205220	ELECTRIC	THERMOSTAT	W/ COVER	AND WIRING		
Unit values Totals	1.00	75.00 \$225	27.55 \$83	0.00 \$0	3.00 0.00 \$0	Ea. 102.55 \$308
U15 MECHANICAL	624	\$29,497	\$13,945	\$0	\$0	\$43,442

=======================================			=======	=========	======:	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	======	=======	=======	======	========
1631200100	HEATING SY	STEM POWI	ER / CONTI	ROL PANEL		
Unit values	2.96	330.76	70.58	0.00	4.00 0.00	Ea. 401.34
Totals	11.85	\$1,323	\$282	\$0	\$0	\$1,605
U16 ELECTRICAL	12	\$1,323	\$282	\$0	\$0.	\$1,605

JOB TOTAL

\$51,359

\_\_\_\_\_\_\_ Description \_\_\_\_\_\_ Manhours Matl Labor Equipment Sub Total \_\_\_\_\_\_ 775 \$32,880 \$0 ESTIMATE TOTAL \$18,479 \$0 \$51,359 0.00% SALES TAX \$0 MATL MARKUP 0.00% \$0 LABOR MARKUP 0.00% \$0 EQUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% \$0 TOTAL BEFORE CONTINGENC \$32,880 \$18,479 \$0 \$0 \$51,359 CONTINGENCY \$0 \$0 0.00% BOND 0.00% PROFIT 0.00% \$0

Estimate: · BLDG 2781 Description:

Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE

Project:

LIMITED EEAP(GLASSBID Date: FORT KNOX, KY Job #:

Location:

Sq. footage: 

City indx:Louisville, KY

															S	U	M	M	A	R	Y	
_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	
										_											_	

	Manhours	Matl	Labor	Equipment	Sub	Total
A09 ELECTRICAL U15 MECHANICAL	139 624	\$2,060 \$29,497	\$4,252 \$13,945	\$0 \$0	\$0 \$0 \$0	\$6,312 \$43,442
U16 ELECTRICAL	12	\$1,323	\$282	\$0 \$0	\$0	\$1,605
TOTAL	775	\$32,880	\$18,479	\$0	\$0	\$51,359
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0 <sup>°</sup>		•	
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%		, -	\$0	\$0	
TOTAL BEFORE COCONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$32,880	\$18,479	. \$0	\$0	\$51,359 \$0 \$0 \$0
JOB TOTAL						\$51,359

# **ECO - 1: INFRARED HEATING CALCULATIONS**

AREA (SF)   X   0.583   HR - SF - F)   X   0.05										PAG	PAGE 1 OF 3
1 AIR CHGS X 76800 VOL (CU FT) X 59 F TEMP DIFF X 0.019 = 0.002  4800 AREA (SF) X 0.105 U VALUE (BTU/SF F TEMPERATURE = 0.003  AREA (SF) X 0.176 U VALUE (BTU/SF F TEMPERATURE = 0.005  AREA (SF) X 0.176 U VALUE (BTU/SF F TEMPERATURE = 0.005  AREA (SF) X 0.177 U VALUE (BTU/SF F TEMPERATURE = 0.005  2334 AREA (SF) X 0.177 U VALUE (BTU/SF F TEMPERATURE = 0.005  2112 AREA (SF) X 0.56 U VALUE (BTU/SF F TEMPERATURE = 0.005  AREA (SF) X 0.56 U VALUE (BTU/SF F TEMPERATURE = 0.007  A		2762	f	шОН	UILDING H UTSIDE DI EMPERATI	IEATING TEMPERA ESIGN TEMPERAT URE DIFFERENCE	ATUR TURE		<u>ır ır 'ır</u>		
320	INFILTRATION LOSSES =	-	AIR CHGS	×	76800	(CU FT)		×	11	0.09	MBTU / HR
4800 AREA (SF) X 0.105 U VALUE (BTU) 59 F TEMPERATURE = 0.03  AREA (SF) X 0.176 HR.SF.F) X 59 F TEMPERATURE = 0.00  2334 AREA (SF) X 0.389 U VALUE (BTU) 59 F TEMPERATURE = 0.05  AREA (SF) X 0.389 U VALUE (BTU) 59 F TEMPERATURE = 0.05  2112 AREA (SF) X 1.235 U VALUE (BTU) 59 F TEMPERATURE = 0.05  2112 AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.05  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.07  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00	FLOOR LOSSES =	320	LINEA	RE	ET OF PER		59	×	11	0.02	MBTU / HR
AREA (SF) X 0.176 U VALUE (BTU) 59 F TEMPERATURE = 0.00  2334 AREA (SF) X 0.389 U VALUE (BTU) 59 F TEMPERATURE = 0.05  AREA (SF) X 0.17 U VALUE (BTU) 59 F TEMPERATURE = 0.05  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.05  2112 AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.05  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.07  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 HR - SF - F) X 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 HR - SF - F) X 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 HR - SF - F) X 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 HR - SF - F) X 59 F TEMPERATURE = 0.00	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800		×	0.105	U VALUE (BTU/ HR-SF-F) X	59	٠ -	II	0.03	MBTU / HR
2334 AREA (SF) X 0.389 U VALUE (BTU/ AREA (SF) X 0.17 U VALUE (BTU/ 624 AREA (SF) X 1.235 U VALUE (BTU/ AREA (SF) X 0.56 U VALUE (BTU/ AREA (SF) X 0.56 U VALUE (BTU/ AREA (SF) X 0.56 U VALUE (BTU/ SO AREA (SF) X 0.56 U VALUE (BTU/ AREA (SF) X 0.56 HR - SF - F) X 59 DIFFERENCE = 0.000	FACE BRICK/BLK WALL =		- AREA (SF)	· ×	0.176	U VALUE (BTU/ HR - SF - F) X	29	٠ ا	II	0.00	MBTU / HR
AREA (SF) X 0.17 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  2112 AREA (SF) X 0.56 U VALUE (BTU/) 59 F TEMPERATURE = 0.05  AREA (SF) X 0.56 U VALUE (BTU/) 59 F TEMPERATURE = 0.07  AREA (SF) X 0.56 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.583 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.583 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/) 59 F TEMPERATURE = 0.00  AREA (SF) X 0.615 U VALUE (BTU/) 59 F TEMPERATURE = 0.00	8" CINDER BLOCK WALL =	2334	AREA (SF)	×	0.389	U VALUE (BTU/ HR - SF - F) X	29		11	0.05	MBTU / HR
624 AREA (SF) X 1.235 U VALUE (BTU/SF) X 59 F TEMPERATURE = 0.05  2112 AREA (SF) X 0.56 U VALUE (BTU/SF) X 59 F TEMPERATURE = 0.07  AREA (SF) X 0.56 U VALUE (BTU/SF) F) X 59 F TEMPERATURE = 0.00  AREA (SF) X 0.583 U VALUE (BTU/SF) F) X 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/SF) F) X 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/SF) F) X 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/SF) F) TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/SF) F) TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/SF) F) TEMPERATURE = 0.00	CORR MTL PNL WALL =		AREA (SF)	· ×	0.17	U VALUE (BTU/ HR - SF - F) X	29		II	0.00	MBTU / HR
2112 AREA(SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.07  AREA(SF) X 0.583 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA(SF) X 0.583 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA(SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  50 AREA(SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA(SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA(SF) X 0.615 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA(SF) X 0.615 U VALUE (BTU/ 59 F TEMPERATURE = 0.00	CLR SGL PANE WINDOWS =	624	AREA (SF)	1 ×	1.235	U VALUE (BTU/ HR - SF - F) X	29		Ħ	0.05	MBTU / HR
AREA (SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.583 U VALUE (BTU/ 59 DIFFERENCE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  50 AREA (SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.615 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.615 U VALUE (BTU/ 59 DIFFERENCE = 0.00	METAL ROLL UP DOORS =	2112	AREA (SF)	· ×	0.56	U VALUE (BTU/ HR - SF - F) X	29	لسا	II	0.07	MBTU / HR
AREA (SF) X 0.583 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  50 AREA (SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.615 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.615 U VALUE (BTU/ 59 F TEMPERATURE = 0.00	MTL OVERHEAD DOORS =		AREA (SF)	×	0.56		29	٠ ــ	11	0.00	MBTU / HR
AREA (SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.56 U VALUE (BTU/ 59 F TEMPERATURE = 0.00  AREA (SF) X 0.615 U VALUE (BTU/ 59 DIFFERENCE = 0.00  AREA (SF) X 0.615 U VALUE (BTU/ 59 DIFFERENCE = 0.00	WOOD GLAZED O'HEAD DR =		AREA (SF)	×	0.583	U VALUE (BTU/ HR - SF - F) X	29		11	0.00	MBTU / HR
50 AREA(SF) X 0.56 U VALUE(BTU/ 59 F TEMPERATURE = 0.00  AREA(SF) X 0.615 U VALUE(BTU/ 59 F TEMPERATURE = 0.00  AREA(SF) X 0.615 HR-SF-F) X 59 DIFFERENCE = 0.00	LG WOOD SLIDING DOOR =		AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	29		ŧI	00.00	MBTU / HR
AREA(SF) X 0.615 U VALUE(BTU/ 59 F TEMPERATURE = 0.00	METAL PERSONNEL DR=	50	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	29		11	00.00	MBTU / HR
	MTL/ GLAZED PERSONNEL=		AREA (SF)	\ <b>×</b>	0.615	U VALUE (BTU/ HR-SF-F) X	29		II	0.00	MBTU / HR

MBTU / HR MJ/HR

0.30 318.18

H H

**TOTAL BASELINE HEAT LOSSES** 

# **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 2 OF 3

BUILDING NUMBER:	2762		BUILDING OUTSIDE TEMPER/	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	RATU TURI	RE SETPOINT: 55	┈ ┈╙┈╙		
INFILTRATION LOSSES =	₩	AIR CHGS X	76800	VOL (CU FT) X	54	F TEMP DIFF X 0.019	II	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR FEET OF		PERIMETER X	54	F TEMP DIFF X 0.81	. II	0.01	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	Ш	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2334	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	н	0.05	MBTU / HR
CORR MTL PNL WALL =	0	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11:	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	624	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
METAL ROLL UP DOORS =	2112	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
MTL OVERHEAD DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	20	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF) X	0.615	U VALUE (BTU/ HR-SF-F) X	. 24	F TEMPERATURE DIFFERENCE	ŧı	0.00	MBTU / HR
									ı

MBTU / HR MJ/HR

0.28 291.21

11 11

TOTAL ECO HEAT LOSSES

ECO - 1: INFRARED HEATING CALCULATIONS

PAGE 3 OF 3

2762

**BUILDING NUMBER** 

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	-
HTG TEMP SETPOINT (F)	09	. 55
HEATING DEGREE DAYS	4616	3306
TOTAL HEAT LOSSES		
(MBTU / HR)	0.30	0.28
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

GLOSSARY OF TERMS
1 MBTU = 1055 MJ
0.019=CONSTANT
.81 = CONSTANT FOR SLAB PERIMETER UNINSTITATED FROM ASUBAE
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HIS ACTIVITY
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 P.2.9.3
7.070 1.000 031

•	ANNIA HEATIN	ATING ENEDA	\(\frac{1}{2}\)						
	INITIAL LIE		2	NG ENERGY CONSUMPTION (DEGREE DAY METHOD)	DEGREE L	λ	METHO	<u>(</u>	
BASELINE =	0.30	MBTU/HR X 46	516 DE	MBTU/HR X 4616 DEGREE DAYS X 24 HRS/DAY	HRS/DAY				
	9.0	SYS EFF X	59 TE	MP DIFFERENCE		11	943.82	MBTU/YR	
	943.82	MBTU/YR	×	CORR FACTOR	_	11		943.82	MBTU/YR
ECO - 1 =	0.28	MBTU/HR X 33	396 DE	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY	HRS/DAY		•		
	9.O	SYSEFF X	54 TEI	MP DIFFERENCE		П	462.91	<b>MBTU/YR</b>	
	462.91	MBTU/YR	×	CORR FACTOR 1			,	462.91	MBTU/YR
	ECO - 1 ANNI	ANNUAL HEATING	S ENER	UAL HEATING ENERGY CONSUMPTION SAVINGS	N SAVINGS	11 11		480.91	MBTU/YR
								00.100,100	MJ/TR

943.82	MBTU/YR X 4.62	\$ /MBTU	11	= 4,360.46 \$ /YR
ECO - 1 = 462.91 MBTU / Y	MBTU/YR X 4.62	\$ /MBTU	11	= 2,138.66 \$ //R

SS	
AS	
ば	
9	
AP	
H	
Ш	
$\mathbf{Z}$	
X	
Ž	
X	

## **ECO - 1: INFRARED HEATING CALCULATIONS**

1 OF 3		MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU/HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU/HR	
PAGE 1		0.09	0.02	0.03	0.00	0.05	0.00	0.05	. 20.0	0.00	0.00	0.00	0.00	0.00	
		11	11	II	Ш	ii	#1	11	II	П	П	IJ	II	II.	
	E SETPOINT: 60	F TEMP DIFF X 0.019	F TEMP DIFF X 0.81	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	
	TURE URE	29	29	59	59	29	59	29	29	59	59	59	59	29	
	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	VOL (CUFT) X	RIMETER X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR-SF-F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR-SF-F) X	U VALUE (BTU/ HR-SF-F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTÚ/ HR - SF - F) X	
	BUILDING DUTSIDE ( TEMPERA <sup>-</sup>	76800	AR FEET OF PERIMETER	0.105	0.176	0.389	0.17	1.235	0.56	0.56	0.583	0.56	0.56	0.615	
	ш о ј-	×	AR FE	×	×	×	×	×	×	×	×	×	×	×	
	ı	_ AIR CHGS	LINE	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	
	2763	-	320	4800		2334		624	2112				20		
	BUILDING NUMBER:	INFILTRATION LOSSES=	FLOOR LOSSES =	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	FACE BRICK/BLK WALL =	8" CINDER BLOCK WALL =	CORR MTL PNL WALL =	CLR SGL PANE WINDOWS =	METAL ROLL UP DOORS =	MTL OVERHEAD DOORS =	WOOD GLAZED O'HEAD DR =	LG WOOD SLIDING DOOR =	METAL PERSONNEL DR=	MTL/ GLAZED PERSONNEL=	
														D. C.C	1

MBTU / HR MJ/HR

11 II

**TOTAL BASELINE HEAT LOSSES** 

# **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAGE	PAGE 2 OF 3
BUILDING NUMBER:	2763		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT. OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	RATU TURE	RE SETPOINT: 55	шшш		
INFILTRATION LOSSES =	_	AIR CHGS X	76800	VOL (CU FT) X	54	F TEMP DIFF X 0.019	11	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR FEET OF		PERIMETER X	54 F	F TEMP DIFF X 0.81		0.01	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	#1	0.03	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	00.00	MBTU / HR
8" CINDER BLOCK WALL =	2334	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
CORR MTL PNL WALL =	0	AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	624	AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
METAL ROLL UP DOORS =	2112	ÀREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
MTL OVERHEAD DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	20	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR

MBTU / HR MJ/HR

0.28 291.21

11 11

**TOTAL ECO HEAT LOSSES** 

### **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

			•
	BASELINE	ECO - 1	BUILE
SYSTEM EFFICIENCY	%09	%06	
OUTSIDE DESIGN TEMP (F)	_	<b>-</b>	1 MBTU
HTG TEMP SETPOINT (F)	09	55	0 019=C
HEATING DEGREE DAYS	4616	3396	.81 = CC
TOTAL HEAT LOSSES	c	c c	CORRE
(MBTU / HR)	0.30	0.28	65 F DE
\$ MBTU -FUEL OIL	\$6.60	\$6.60	
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
\$ /MBTU -PPG	\$10.84	\$10.84	

BUILDING NUMBER 2763	
GLOSSARY OF TERMS	
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	FFECT VS
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2	)

AI	ANNUAL HEATIN	ATING ENERGY	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY MET	НОД)	
BASELINE =	0.30	MBTU/HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	_ = 943.82	2 MBTU/YR	
	943.82	MBTU/YR X	CORR FACTOR 1	II	943.82	MBTU/YR
ECO - 1 =	0.28	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	_ = 462.91	1 MBTU/YR	•
	462.91	MBTU/YR X	CORR FACTOR 1	11	462.91	MBTU/YR
	ECO - 1	ANNUAL HEATING E	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 II	480.91 507,357.33	MBTUMR

	ANNUAL	<b>ANNUAL HEATING ENERGY COST</b>	ENERG	Y COST				
BASELINE =	943.82	MBTU/YR X 4.62	4.62	\$ /MBTU	11	= 4,360.46 \$ /YR	\$ MR	
ECO - 1 =	. 462.91	MBTU/YR X 4.62	4.62	\$ /MBTU	. 11	= 2,138.66 \$ /YR	_\$ /YR	
	ECO - 1 ANNI	JAL HEATING E	NERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 2.221.79 \$ /YR	11	2.221.79	8 / S	

•		T KNOX		FT KNOX LIMITED EEAP (GLASS)		SLASS)			•
	E(	ECO - 1: INFF	NFRARED	HEATING CA	$\vec{\Sigma}$	CALCULATIONS		•	
BUIL DING NUMBER:	2764		SNIC III B	BI III DING HEATING TEMBEBATI IBE SETBOINT:	JGI 11	. FNIOGER		PAGE	1 OF 3
			OUTSIDE I TEMPERA	DOLDING HEATING TEMPERATURE OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	A H		ᄕᄔ		
INFILTRATION LOSSES =	-	AIR CHGS X	76800	VOL (CUFT) X	59	F TEMP DIFF X 0.019	11	0.09	MBTU / HR
FLOOR LOSSES =	320	LINEAR FI	LINEAR FEET OF PERIMETER	RIMETER X	59	F TEMP DIFF X 0.81	II	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2334	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
CORR MTL PNL WALL =		AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	624	AREA (SF) X	1.235	U VALUE (BTÜ/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
METAL ROLL ÚP DOORS =	2112	AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	. 20.0	MBTU / HR
MTL OVERHEAD DOORS =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU/HR
WOOD GLAZED O'HEAD DR =		AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II.	0.00	MBTU / HR
LG WOOD SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	20	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	<b>41</b>	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=		AREA (SF) X	0.615	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR

MBTU / HR MJ/HR

0.30 318.18

11 11

**TOTAL BASELINE HEAT LOSSES** 

# **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 2 OF 3

BUILDING NUMBER:	2764	·	BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	RATUI TURE	RE SETPOINT: 55	_ _ <b>և և և և</b>		
INFILTRATION LOSSES =	_	AIR CHGS X	76800	VOL (CU FT) X	54	F TEMP DIFF X 0.019	II	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR FEET OF		PERIMETER X	54 F	F TEMP DIFF X 0.81	<b>1</b> 1	0.01	MBTU / HR
SURFACE HEAT LOSSES		-							
FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2334	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
CORR MTL PNL WALL =	0	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	n	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	624	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
METAL ROLL UP DOORS =	2112	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
MTL OVERHEAD DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	#	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	00.00	MBTU / HR
METAL PERSONNEL DR=	20	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATUŘE DIFFERENCE	11	0.00	MBTU / HR
							1		ı

MBTU / HR MJ/HR

0.28 291.21

11 11

TOTAL ECO HEAT LOSSES

### **ECO - 1: INFRARED HEATING CALCULATIONS**

	ECO - 1	%06	_	55	3396	or c	0.20	\$6.60	\$4.62	\$10 R4
	BASELINE	%09	_	09	4616	0.00	0.00	\$6.60	\$4.62	\$10.84
-		SYSTEM EFFICIENCY	OUTSIDE DESIGN TEMP (F)	HTG TEMP SETPOINT (F)	HEATING DEGREE DAYS	TOTAL HEAT LOSSES	(MBTU / HR)	\$ /MBTU -FUEL OIL	\$ /MBTU -NATURAL GAS	\$ /MBTU -PPG

, PAGE 3 OF 3
BUILDING NUMBER 2764
GLOSSARY OF TERMS
1 MBTU = 1055 MJ
0.019=CONSTANT
.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING FFFECT VS
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

		MBTU/YR		MBTU/YR	MBTU/YR MJ/YR
(a	MBTU/YR	943.82	MBTU/YR	462.91	480.91 507,357.33
METHO	943.82		462.91		
DAY	11	11	11	П	11 11
ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	MBTU/YR X CORR FACTOR 1	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	MBTU/YR X CORR FACTOR 1	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS
INUAL HEA	0.30	943.82	0.28	462.91	EC0 - 1
AN	BASELINE =		ECO -1=		

	ANNOA	ANNUAL HEATING ENERGY COST	NERG	Y COST				
BASELINE =	943.82	MBTU/YR X 4.62	4.62	\$ /MBTU	н	= 4,360.46 \$ /YR	\$ /YR	
ECO - 1 =	462.91	MBTU/YR X 4.62	4.62	* /MBTU	11	2,138.66 \$ /YR	_\$ /YR	
	ECO - 1 ANNI	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 2.221.79 \$ /YR	NERGY (	SOST SAVINGS	II	2.221.79	8 / S	

## **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAG	PAGE 1 OF 3
BUILDING NUMBER:	2765	1	BUILDING H OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	VTURI URE	:	60 F 1 F 59 F		
INFILTRATION LOSSES =	-	AIR CHGS X	76800	VOL (CU FT) X	59	F TEMP DIFF X 0.019	 	0.09	MBTU / HR
FLOOR LOSSES =	320	LINEAR	IEAR FEET OF PERIMETER	RIMETER X	29	F TEMP DIFF X 0.81	II	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2334	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	П	0.05	MBTU / HR
CORR MTL PNL WALL =		AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	624	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
METAL ROLL UP DOORS =	2112	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.07	MBTU / HR
MTL OVERHEAD DOORS =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =		AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
LG WOOD SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=	20	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	Ш	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=		AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	ti	0.00	MBTU / HR

MBTU / HR MJ/HR

0.30 318.18

11 11

**TOTAL BASELINE HEAT LOSSES** 

# **ECO - 1: INFRARED HEATING CALCULATIONS**

BUILDING HEATING TEMPERATURE OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE  X 76800 VOL (CU FT) X 54 F TEN  X 0.105 WALUE (BTU/ 54 F  X 0.389 WALUE (BTU/ 54 F  X 0.389 WALUE (BTU/ 54 F  X 0.17 WALUE (BTU/ 54 F  X 0.17 WALUE (BTU/ 54 F  X 0.56 WALUE (BTU/ 54 F  X 0.615 W				· i					PAGE	PAGE 2 OF 3
1 AIR CHGS X 76800 VOL (CU FT) X 54 FTER  4800 AREA (SF) X 0.105 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.176 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.176 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.176 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.177 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.1235 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.56 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.56 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.583 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.583 U VALUE (BTU/S F F) X 0 AREA (SF) X 0.56 U VALUE (BTU/S F F) X		2765		BUILDING OUTSIDE TEMPER	HEATING TEMPERA' DESIGN TEMPERATU TURE DIFFERENCE	Ture Jre	SETPOINT: 55	ا <b>ند ند</b> ېد		
320 LINEAR FEET OF PERIMETER X 54 F TER 4800 AREA (SF) X 0.105 U VALUE (BTU/ 0 AREA (SF) X 0.176 U VALUE (BTU/ 0 AREA (SF) X 0.389 U VALUE (BTU/ 624 AREA (SF) X 0.56 U VALUE (BTU/ 0 AREA (SF) X 0.583 U VALUE (BTU/ 0 AREA (SF) X 0.56 HR-SF-F) X 54 F 0 AREA (SF) X 0.56 HR-SF-F) X 54 F 0 AREA (SF) X 0.56 HR-SF-F) X 54 F 0 AREA (SF) X 0.56 HR-SF-F) X 57 F 0 AREA (SF) X 0.56 HR-SF-F) X 54 F	LOSSES =	-		76800	×		EMP DIFF X 0.019	II	0.08	_MBTU / HR
4800 AREA (SF) X 0.105 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.176 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.389 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.17 U VALUE (BTU/54 F) X 2112 AREA (SF) X 1.235 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.56 HR - SF - F) X 0 AREA (SF) X 0.56 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.56 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.56 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.56 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.56 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.56 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.56 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.615 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.615 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.615 U VALUE (BTU/54 F) X 0 AREA (SF) X 0.615 U VALUE (BTU/54 F) X	LOSSES =	320	LINEAR FE		×		EMP DIFF X 0.81	11	0.01	_ MBTU / HR
0 AREA(SF) X 0.176 U VALUE (BTU) 54 F 2334 AREA(SF) X 0.389 U VALUE (BTU) 54 F 0 AREA(SF) X 0.17 U VALUE (BTU) 54 F 624 AREA(SF) X 1.235 HR-SF-F) X 64 F 2112 AREA(SF) X 0.56 U VALUE (BTU) 54 F 0 AREA(SF) X 0.56 U VALUE (BTU) 54 F 0 AREA(SF) X 0.56 HR-SF-F) X 64 F 0 AREA(SF) X 0.56 U VALUE (BTU) 54 F 0 AREA(SF) X 0.56 HR-SF-F) X 64 F 0 AREA(SF) X 0.56 U VALUE (BTU) 54 F 0 AREA(SF) X 0.56 HR-SF-F) X 64 F 0 AREA(SF) X 0.56 HR-SF-F) X 64 F 0 AREA(SF) X 0.56 HR-SF-F) X 64 F 0 AREA(SF) X 0.56 HR-SF-F) X 65	<b>!!</b>	4800	AREA (SF)	0.105			TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
2334 AREA (SF) X 0.389 U VALUE (BTU) 54 F CONTRIBED STATES	SLK WALL =	0	(SF)	0.176			TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
0 AREA(SF) X 0.17 UVALUE(BTU/ 54 F 624 AREA(SF) X 1.235 U VALUE(BTU/ 54 F 2112 AREA(SF) X 0.56 UVALUE(BTU/ 54 F 0 AREA(SF) X 0.56 UVALUE(BTU/ 54 F 0 AREA(SF) X 0.583 U VALUE(BTU/ 54 F 0 AREA(SF) X 0.583 U VALUE(BTU/ 54 F 0 AREA(SF) X 0.56 UVALUE(BTU/ 54 F 50 AREA(SF) X 0.56 UVALUE(BTU/ 54 F 50 AREA(SF) X 0.56 UVALUE(BTU/ 54 F 60 AREA(SF) X 0.615 UVALUE(BTU/ 54 F 61 AREA(SF) X 0.		2334	(SF)	0.389	_		TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
624 AREA (SF) X 1.235 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.56 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.56 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.583 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.583 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.56 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.56 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.56 U VALUE (BTU/ 54 F 1212 AREA (SF) X 0.615 U VALUE (STU/ 54 F 1212 AREA (SF) X 0.615 U VALUE (STU/ 54 F 1212 AREA (SF) X 0.615 U VALUE (STU/ 54 F 1212 AREA (SF) X 0.615 U VALUE (STU/ 54 F 1212 AREA (SF) X 0.615 U VALUE (STU/ 54 F 1212 AREA (SF) X 0.615 U VALUE (STU/ 54 F 1212 AREA (SF) X 0.615 U VALUE (STU/	PNL WALL =	0	(SF)	0.17	_	_	TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
2112 AREA (SF) X 0.56 U VALUE (BTU) 54 F CONTROL (B	MINDOWS =	624	(SF)	1.235			TEMPERATURE DIFFERENCE	н	0.04	MBTU / HR
0 AREA(SF) X 0.56 U VALUE(BTU/ 54 F 0 AREA(SF) X 0.583 U VALUE(BTU/ 54 F 0 AREA(SF) X 0.56 U VALUE(BTU/ 54 F 50 AREA(SF) X 0.56 U VALUE(BTU/ 54 F 0 AREA(SF) X 0.56 U VALUE(BTU/ 54 F 0 AREA(SF) X 0.615 Ü VALUE(BTU/ 54 F 0 AREA(SF) X 0.615 Ü VALUE(BTU/ 54 F		2112		0.56			TEMPERATURE DIFFERENCE	. #	90.0	MBTU / HR
0 AREA(SF) X 0.583 U VALUE(BTU/ 54 F CONTROL OF AREA(SF) X 0.56 U VALUE(BTU/ 54 F CONTROL OF AREA(SF) X 0.56 U VALUE(BTU/ 54 F CONTROL OF AREA(SF) X 0.615 U VALUE(SF) X 0.6	DOORS =	0	(SF)	0.56	∋×		TEMPERATURE DIFFERENCE	ŧI	0.00	MBTU / HR
0 AREA (SF) X 0.56 U VALUE (BTU/ 54 F C C C C C C C C C C C C C C C C C C	'HEAD DR =	0	(SF)	0.583	_		TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
50 AREA(SF) X 0.56 U VALUE(BTU/ 54 F C C C C C C C C C C C C C C C C C C	NG DOOR =	0	(SF)	0.56			TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
0 AREA(SF) X 0.615 US SE (STU) 54 F	ONNEL DR=	20	(SF)	0.56			TEMPERATURE DIFFERENCE	il	0.00	MBTU / HR
TK-31-1) A	ERSONNEL=	0	(SF)	0.615	Ú VALUE (BTU/ HR - SF - F) X 54		TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR

MBTU / HR MJ/HR

0.28 291.21

11 11

TOTAL ECO HEAT LOSSES

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

	BASELINE	ECO - 1	
SYSTEM EFFICIENCY	%09	%06	
OUTSIDE DESIGN TEMP (F)	-	-	
HTG TEMP SETPOINT (F)	09	55	
HEATING DEGREE DAYS	4616	3396	
TOTAL HEAT LOSSES	0.30	0.28	
\$ /MBTU -FUEL OIL	\$6.60	\$6.60	
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
\$ /MBTU -PPG	\$10.84	\$10.84	

2765	GLOSSARY OF TERMS			81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2
BUILDING NUMBER		1 MBTU = 1055 MJ	0.019=CONSTANT	.81 = CONSTANT FOR SLAB	CORR FACTOR = EMPIRIC	65 F DEGREE-DAYS FROM

A	NNUAL HEA	TING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	E DAY	METHO	<u>(</u>	
BASELINE =	0.30	MBTU / HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	<b>"</b> 	943.82	MBTU/YR	
	943.82	MBTU/YR X	CORR FACTOR 1	II		943.82	MBTU/YR
ECO - 1=	0.28	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	<b>II</b>	462.91	MBTU/YR	
•	462.91	MBTU/YR X	CORR FACTOR 1	II	•	. 462.91	MBTU/YR
	ECO - 1 ANNU	ANNUAL HEATING E	IAL HEATING ENERGY CONSUMPTION SAVINGS	и и 8		480.91	MBTU/YR

	ANNOAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST			
BASELINE =	943.82	MBTU/YR X 4.62	4.62	\$ /MBTU	П	4,360.46 \$ /YR	\$ MR
ECO - 1=	462.91	MBTU/YR X 4.62	4.62	* /MBTU	11	2,138.66 \$ /YR	\$ /YR
	ECO - 1 ANNI	JAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 2,221.79 \$ //R	11	2,221.79	<b>\$</b> /∀R

# **ECO - 1: INFRARED HEATING CALCULATIONS**

		•						PAGE 1	: 1 OF 3
BUILDING NUMBER:	2766	1	BUILDING H OUTSIDE D TEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUR URE	E SETPOINT: 60	<u> </u>		
INFILTRATION LOSSES =	_	AIR CHGS X	76800	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.09	MBTU / HR
FLOOR LOSSES=	320	LINEAR FE	EAR FEET OF PERIMETER	RIMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	ш	00.00	MBTU / HR
8" CINDER BLOCK WALL =	2334	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	Ш	0.05	MBTU / HR
CORR MTL PNL WALL =		AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	п	00.00	MBTU / HR
CLR SGL PANE WINDOWS =	624	AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
METAL ROLL UP DOORS =	2112	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.07	MBTU / HR
MTL OVERHEAD DOORS =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II:	00.00	MBTU / HR
WOOD GLAZED O'HEAD DR =		AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	00.00	MBTU / HR
LG WOOD SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
METAL PERSONNEL DR=	50	AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
MTL/ GLAZED PERSONNEL=		AREA (SF) X	0.615	U VALUE (BTU/ HR-SF-F) X	29	'F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
				:			1		

MBTU / HR MJ/HR

0.30 318.18

11 11

**TOTAL BASELINE HEAT LOSSES** 

# **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 2 OF 3

	BUILDING NUMBER:	2766		BUILDING OUTSIDE TEMPER	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUI FURE	RE SETPOINT: 55	_ _ <b>և և ,և</b> _		
	INFILTRATION LOSSES =	-	AIR CHGS X	76800	VOL (CUFT) X	54	F TEMP DIFF X 0.019	11	0.08	MBTU / HR
	FLOOR LOSSES =	320	LINEAR FEET OF		PERIMETER X	54	F TEMP DIFF X 0.81	II	0.01	MBTU / HR
	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE	Ħ	0.03	MBTU / HR
	FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	8" CINDER BLOCK WALL =	2334	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
	CORR MTL PNL WALL =	0	AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	п	0.00	MBTU / HR
	CLR SGL PANE WINDOWS =	624	AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	. 11	0.04	MBTU / HR
	METAL ROLL UP DOORS =	2112	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	24	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
	MTL OVERHEAD DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
	WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	LG WOOD SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
	METAL PERSONNEL DR=	20	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	n	00.0	MBTU / HR
D . c-	MTL' GLAZED PERSONNEL=	0	AREA (SF) X	0.615	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	• Ii	0.00	MBTU / HR
,										

MBTU / HR MJ/HR

0.28 291.21

11 11

TOTAL ECO HEAT LOSSES

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

**BUILDING NUMBER** 

PAGE 3 OF 3

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	_	<del></del>
HTG TEMP SETPOINT (F)	09	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0:30	0.28
\$ /WBTU -FUEL OIL	\$6.60	\$6.60
<b>\$ /MBTU -NATURAL GAS</b>	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

	<b>ANNUAL HEATIN</b>	ATING ENERGY (	IG ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY METH	(ac	
BASELINE =	0.30		MBTU/HR X 4616 DEGREE DAYS X 24 HRS/DAY			
	0.0	SISER A SS LEMP DIFFERENCE	LEIMP DIFFERENCE	= 943.82	MBIO/YR	
	943.82	MBTU/YR X	CORR FACTOR 1	11	943.82	MBTU/YR
ECO - 1 =	0.28	MBTU / HR X 3396	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY			
٠	6.0	SYS EFF X 54	TEMP DIFFERENCE	= 462.91	MBTU/YR	•
	462.91	MBTU/YR X	CORR FACTOR 1	ıı	462.91	MBTU/YR
	ECO - 1 ANN	ANNUAL HEATING E	UAL HEATING ENERGY CONSUMPTION SAVINGS	11 11	480.91	MBTU/YR

	ANNUAL	<b>ANNUAL HEATING ENERGY COST</b>	ENERG	YCOST			
BASELINE =	943.82	MBTU/YR X 4.62	4.62	\$ /MBTU	ti	= 4,360.46 \$ /YR	\$ MR
ECO - 1=	462.91	MBTU/YR X 4.62	4.62	\$ /MBTU	ti	2,138.66 \$ MR	\$ ∕YR
	ECO - 1 ANNI	JAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS	11	2,221.79 \$ //R	\$ MR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

										PAGE 1	10F3
	BUILDING NUMBER:	2767	I		BUILDING F OUTSIDE DI FEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE		60 F F F F		
	INFILTRATION LOSSES =	-	_ AIR CHGS	×	76800	VOL (CU FT) X	59	F TEMP DIFF X 0.019	11	0.09	MBTU / HR
	FLOOR LOSSES =	320	LINEA	IR FE	LINEAR FEET OF PERIMETER	IMETER X	29	F TEMP DIFF X 0.81	II	0.02	MBTU / HR
	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF)	×	0.105	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
	FACE BRICK/BLK WALL =		AREA (SF)	×	0.176	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	8" CINDER BLOCK WALL =	2334	AREA (SF)	<b>×</b>	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
	CORR MTL PNL WALL =		AREA (SF)	×	0.17	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR
•	CLR SGL PANE WINDOWS =	624	AREA (SF)	<b>\</b> ×	1.235	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
	METAL ROLL UP DOORS =	2112	ÄREA (SF)	<b>'</b> ×	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.07	MBTU / HR
	MTL OVERHEAD DOORS =		AREA (SF)	<b>×</b>	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	WOOD GLAZED O'HEAD DR =		AREA (SF)	<b>'</b> ×	0.583	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	LG WOOD SLIDING DOOR =		AREA (SF)	<b>×</b>	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	METAL PERSONNEL DR=	20	AREA (SF)	<b>×</b>	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	MTL/ GLAZED PERSONNEL=		AREA (SF)	.×	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
1 110						TOTAL BASEL	INE I	TOTAL BASELINE HEAT LOSSES	11 11	0.30 318.18	MBTU / HR MJ/HR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

MBTU / HR MJ/HR

0.28 291.21

11 11

TOTAL ECO HEAT LOSSES

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	_	-
HTG TEMP SETPOINT (F)	90	25
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES (MBTU / HR)	0:30	0.28
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

BUILDING NUMBER 2767
GLOSSARY OF TERMS
1 MBTU = 1055 MJ
0.019=CONSTANT
.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

MBTU/YR	480.91		11 11	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS
MBTU/YR	462.91		11	462.91 MBTU/YR X CORR FACTOR 1
	MBTU/YR	462.91	II	ECO -1= 0.28 MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY 0.9 SYS EFF X 54 TEMP DIFFERENCE
MBTU/YR	943.82		II	943.82 MBTU/YR X CORR FACTOR 1
	MBTU/YR	943.82	11	BASELINE = 0.30 MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY 0.6 SYS EFF X 59 TEMP DIFFERENCE
	(D)	METHO	DAY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)

	ANNOAL	<b>ANNUAL HEATING ENERGY COST</b>	ENERG	Y COST			
BASELINE =	943.82	MBTU/YR X 4.62	4.62	\$ /MBTU	н	4,360.46 \$ /YR	\$ MR
ECO - 1 =	462.91	MBTU/YR X 4.62	4.62	\$ /MBTU	и .	2,138.66 \$ MR	\$ \text{\tint}\xititt{\text{\tert{\text{\texi}\tint{\text{\text{\text{\text{\texi}}\tint{\text{\text{\text{\text{\text{\text{\texi}\text{\text{\texi}\tint{\tex{\texit{\texit{\texi{\texi{\texi{\texi}\texit{\text{\texi}\tint{\texitit}}\tint{\texit{\texi{\texi{\texi{\texi}\texit{\texi
	ECO - 1 ANNI	UAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS =	ti	2,221.79 \$ /YR	\$ MR

SS
A
Ĺ
9
<u></u>
7
Ш
Ш
Ш
느
Σ
三
$\mathbf{x}$
0
Ž
Y
낦
Щ

# **ECO - 1: INFRARED HEATING CALCULATIONS**

						-		PAGE	PAGE 1 OF 3
BUILDING NUMBER:	2778	- - - - - - - - - - - - - - - - - - -	JILDING HE/ JTSIDE DES IMPERATUR	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 68	<u>ш. ш. ш.</u>		
INFILTRATION LOSSES =	-	AIR CHGS X 1	1349500 \	VOL (CU FT) X	29	F TEMP DIFF X 0.019	11	1.72	MBTU / HR
FLOOR LOSSES=	1220	LINEAR FEE	R FEET OF PERIMETER	METER X	29	F TEMP DIFF X 0.81	II	0.07	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	49500	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.35	MBTU / HR
FACE BRICK/BLK WALL =		AREA(SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	9371	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.24	MBTU / HR
CORR MTL PNL WALL =	12120	AREA (SF) X	0.4	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	u	0.32	MBTU / HR
CLR SGL PANE WINDOWS =	5465	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.45	MBTU / HR
METAL ROLL UP DOORS =	384	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	. 11	0.01	MBTU / HR
MTL OVERHEAD DOORS =	384	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.01	MBTU / HR
WOOD GLAZED O'HEAD DR =		AREA(SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	·	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	100	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=		AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F. TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
				TOTAL BASELINE HEAT LOSSES	NE T	EAT LOSSES	11 11	3,361.42	MBTU / HR MJ/HR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAGE	PAGE 2 OF 3
BUILDING NUMBER:	2778		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	KATUI TURE	RE SETPOINT: 55	<u> </u>		
INFILTRATION LOSSES =	<del></del>	AIR CHGS X	1349500	VOL (CU FT) X 54 F TEMP DIFF	54	TEMP DIFF X 0.019	11	1.38	MBTU / HR
FLOOR LOSSES =	1220	LINEAR FEET OF PERIMETER	ET OF PE	RIMETER X	54 F	F TEMP DIFF X 0.81	II	0.05	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	49500	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.28	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	9371	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.20	MBTU / HR
CORR MTL PNL WALL =	12120	AREA (SF) X	9.0	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.26	MBTU / HR
CLR SGL PANE WINDOWS =	5465	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.36	MBTU / HR
METAL ROLL UP DOORS = `	384	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	. 25	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
MTL OVERHEAD DOORS =	384	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.01	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	ŧI	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	100	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
_				TOTAL ECO HEAT LOSSES	HEA	T LOSSES	11 11	2.57 2,709.20	MBTU / HR MJ/HR

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

			•
	BASELINE	ECO - 1	
SYSTEM EFFICIENCY	%09	%06	ī
OUTSIDE DESIGN TEMP (F)	Ψ-	<del>-</del>	
HTG TEMP SETPOINT (F)	68	55	
HEATING DEGREE DAYS	4616	3396	
TOTAL HEAT LOSSES	3 10	2.57	
(MBTU / HR)	 S	i	
\$ /MBTU -FUEL OIL	\$6.60	\$6.60	_,
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
\$ /MBTU -PPG	\$10.84	\$10.84	

#### BUILDING NUMBER 2778

PAGE 3 OF 3

GLOSSARY OF TERMS
1 MBTU = 1055 MJ
0.019=CONSTANT
.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

# ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)

BASELINE =	3.19	MBTU / HR X	4616	DEGREE DAYS X 24 HRS/DA	>			
	9.0	SYS EFF X	29	0.6 SYS EFF X 67 TEMP DIFFERENCE	II	8,780.53	MBTU/YR	
	8,780.53	MBTU/YR	×	CORR FACTOR 1	11		8,780.53	MBTU/YR
ECO - 1 =	2.57	MBTU / HR X	3396	2.57 MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY	<b>&gt;</b>			
	6.0	SYS EFF X	54 .	TEMP DIFFERENCE	II 	4,306.57	MBTU/YR	
	4,306.57	MBTU/YR	×	CORR FACTOR 1	II		4,306.57	MBTU/YR
	EC0-1	ANNUAL HEATI	NG EN	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	⊞ SSI		4,473.96 4,720,030.49	MBTU/YR MJ/YR

#### 19,896.35 \$ /YR 20,669.71 \$ /YR 40,566.06 \$ /YR ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = \$ /MBTU \$ /MBT∪ **ANNUAL HEATING ENERGY COST** MBTU/YR X 4.62 MBTU/YR X 4.62 8,780.53 4,306.57 BASELINE = ECO - 1 =

# **ECO - 1: INFRARED HEATING CALCULATIONS**

										PAGE	1 OF 3	
	BUILDING NUMBER:	2781		<del></del> 1	BUILDING F OUTSIDE D TEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 66 F 1 F 1 F 65 F	<u>кк</u> ц.			
	INFILTRATION LOSSES =	-	AIR CHGS	×	479232	VOL (CU FT) X	65	F TEMP DIFF X 0.019	II .	0.59	MBTU / HR	
	FLOOR LOSSES=	1064	LINEA	AR FE	R FEET OF PERIMETER	IMETER X	65	F TEMP DIFF X 0.81	11	90.0	MBTU / HR	
	SURFACE HEAT LOSSES					L		•				
	FLAT BUILT UP ROOF =	29952	AREA (SF)	×	0.105	U VALUE (BIU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	11	0.20	MBTU / HR	
	FACE BRICK/BLK WALL =		AREA (SF)	×	0.176	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR	
	8" CINDER BLOCK WALL =	15393	AREA (SF)	×	0.389	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II	0.39	MBTU/HR	
	CORR MTL PNL WALL =		AREA (SF)	×	0.4	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR	
	CLR SGL PANE WINDOWS =	80	AREA (SF)	×	1.235	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II	0.01	MBTU/HR	
	METAL ROLL UP DOORS =	1331	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	92	F TEMPERATURE DIFFERENCE	11	0.05	MBTÜ / HR	
	MTL OVERHEAD DOORS =		AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	92	F TEMPERATURE DIFFERENCE	il	0.00	MBTU/HR	
	WOOD GLAZED O'HEAD DR =		AREA (SF)	×	0.583	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	H	0.00	MBTU/HR	
	LG MTL SLIDING DOOR =	121	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR	
	METAL PERSONNEL DR=	100	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	92	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR	
0	MTL/ GLAZED PERSONNEL=		AREA (SF)	×	0.615	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR	
4 4 4 6						TOTAL BASELINE HEAT LOSSES	INE T	HEAT LOSSES	11 11	1.30 1,376.16	MBTU / HR MJ/HR	

# **ECO - 1: INFRARED HEATING CALCULATIONS**

-									PAGE 2	2 OF 3
	BUILDING NUMBER:	2781		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUR TURE	RE SETPOINT: 55	<u></u>		
	INFILTRATION LOSSES =	_	AIR CHGS X	479232	VOL (CUFT) X	54 F	F TEMP DIFF X 0.019	n	0.49	MBTU / HR
	FLOOR LOSSES=	1064	LINEAR FEET OF		PERIMETER X	54 F	F TEMP DIFF X 0.81	11	0.05	MBTU / HR
	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	29952	AREA (SF) X	0.105	U VALUE (BTU/	75	F TEMPERATURE	ti	0.17	MBTU / HR
	FACE BRICK/BLK WALL =	0		0.176	U VALUE (BTU/ HR-SF-F) X	54	DIFFERENCE F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
	8" CINDER BLOCK WALL =	15393	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.32	MBTU / HR
	CORR MTL PNL WALL =	0	AREA (SF) X	9.0	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	CLR SGL PANE WINDOWS =	80	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	. 11	0.01	MBTU / HR
	METAL ROLL UP DOORS =	1331	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
	MTL OVERHEAD DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	В	0.00	MBTU / HR
	LG WOOD SLIDING DOOR =	121	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	METAL PERSONNEL DR=	100	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	MTL/ GLAZED PERSONNEL=	0	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE		0.00	MBTU / HR
					TOTAL ECO HEAT LOSSES	HEA	TLOSSES	11 11	1.08 1,143.27	MBTU / HR MJ/HR

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF,3

2781

**BUILDING NUMBER** 

•		
	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	-
HTG TEMP SETPOINT (F)	99	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES (MBTU / HR)	1.30	1.08
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

GLOSSARY OF TERMS
1 MBTU = 1055 MJ
0.019=CONSTANT
.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

IG ENERGY CONSUMPTION (DEGREE DAY METHOD)
MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 65 TEMP DIFFERENCE
MBTU/YR X CORR FACTOR
MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE
MBTU/YR X CORR FACTOR
ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS

	ANNUAL	<b>ANNUAL HEATING ENERGY COST</b>	ENERG	Y COST				
BASELINE =	3,705.36	MBTU/YR X 4.62	4.62	\$ /MBTU	11	= 17,118.75 \$ /YR	\$ /YR	
ECO - 1=	1,817.36	MBTU / YR X 4.62	4.62	\$ /MBTU	11	8,396.20 \$ /YR	\$ /YR	<del></del>
				·				
	ECO - 1 ANNI	JAL HEATING E	<b>ENERGY</b>	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 8,722.55 \$ //R	11	8,722.55	\$ /YR	

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.080 INSTALLATION & LOCATION: FORT KNOX REGION NOS. 4 CENSUS: 3 PROJECT NO. & TITLE: 2770ECO1 ECO-1 INFRARED HEAT FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED ANALYSIS DATE: 10-18-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH 1. INVESTMENT A. CONSTRUCTION COST \$ 246635.
B. SIOH \$ 12332.
C. DESIGN COST \$ 12332.
D. TOTAL COST (1A+1B+1C) \$ 271299. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ F. PUBLIC UTILITY COMPANY REBATE Ο. G. TOTAL INVESTMENT (1D - 1E - 1F) 271299. 2. ENERGY SAVINGS (+) / COST (-)
DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1993 UNIT COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5) FUEL 0. \$ 0. 0. \$ 0. 0. \$ 0. 14847. \$ 68594. 0. \$ 0. 0. \$ 0. 14847. \$ 68594. A. ELECT \$ 15.61 0. .00 0. B. DIST \$ 6.60 17.56 0. C. RESID \$ .00 19.97 0. 20.96 17.58 D. NAT G \$ 4.62 E. COAL \$ .00 F. LPG \$ .00 0. 16.12 0. M. DEMAND SAVINGS 14.74 0. N. TOTAL 3. NON ENERGY SAVINGS(+) / COST(-) 1980. A. ANNUAL RECURRING (+/-)(1) DISCOUNT FACTOR (TABLE A) 14.74 (2) DISCOUNTED SAVING/COST (3A X 3A1) 29185. B. NON RECURRING SAVINGS(+) / COSTS(-) SAVINGS(+) YR DISCNT DISCOUNTED COST(-) OC FACTR SAVINGS(+)/ ITEM (1) (2) COST(-)(4) .86 5 15 1. REPAIR 19454. 22621. .63 22621. 14251. 2. REPAIR2 6423. 7 .81 3. REPAIR3 5202. 14 . 6423. 4175. 4. REPAIR4 .65 d. TOTAL \$ 58088. 43083. C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 72268. 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 73478. 5. SIMPLE PAYBACK PERIOD (1G/4) **3.69 YEARS** \$ 1509995. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) 7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) =5.57 (IF < 1 PROJECT DOES NOT QUALIFY) 12.34 % 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

LIFE CYCLE COST ANALYSIS SUMMARY

STUDY: 2770ECO1

BLDG 2770 Date: 14-Oct-94 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: \*\*\*\*\* City indx:Louisville, KY Sq. footage: \_\_\_\_\_\_\_\_ Description Line # Equipment Manhours Matl Labor \_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 4"DIAMETER 1800.00 L.F. Unit values 0.15 3.16 1.29 0.00 0.00 4.44 Totals 270.00 \$0 \$5,681 \$2,313 \$0 \$7,994 0207180380 HVAC DEMO, BOILER GAS/OIL STL >150MBH 2.00 Ea. 323.82 0.00 Unit values 12.00 0.00 0.00 323.82 Totals \$0 24.00 \$0 \$648 \$0 \$648 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 5.00 Ton Unit values 0.00 380.36 0.00 0.00 14.55 380.36 \$1,902 Totals 72.73 \$0 \$1,902 \$0 \$0 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 1800.00 L.F. 0.24 Unit values 1.97 0.07 0.00 0.00 2.21 Totals 127.80 \$0 \$3,553 \$426 \$0 \$3,979 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 200.00 Ea. Unit values 0.20 0.00 5.55 0.68 0.00 6.23 Totals 40.00 \$0 \$1,110 \$136 \$0 \$1,246 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. Unit values 259.60 1.56 35.47 5.91 300.98 0.00 Totals 1.56 \$260 \$35 \$6 \$0 \$301 0268520600 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 2"DIAM 150.00 L.F. Unit values 0.11 2.19 3.18 0.19 0.00 5.55 Totals 17.10 \$328 \$476 \$28 \$0 \$832 U02 SITEWORK

554

\$588

\$13,405 .\$2,909

\$16,902

\$0

<b>J</b> ============		========	=======		========	========
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
	========	======	========			=======
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	I (See Atta	ached for I	•
Unit values Totals	0.00 0.00	0.00 \$0	0.00 \$0	0.00 \$0	188191.00 \$188,191	188191.00
1562600139	GAS APPLIA	NCE REGULZ PE SIZE	ATORS DOU	BLE DIAPHR	RAGM 1.00	Fa
Unit values Totals	0.73 0.73	420.00 \$420	16.42 \$16	· 0.00 \$0	0.00	436.42 \$436
U15 MECHANICAL	1	\$420	\$16	\$0	\$188,191	\$188,627

	=======					========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======			========	========
·						
ESTIMATE TOTAL	555	\$1,008	\$13,421	\$2,909	\$188,191	\$205,529
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00% 0.00%	\$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
					·	
TOTAL BEFORE CONTINGENCY	ONTINGENC 10.00%	\$1,008	\$13,421	\$2,909	\$188,191	\$205,529 \$20,553
BOND PROFIT	0.00% 10.00%					\$0 \$20,553
		,				
JOB .TOTAL		•			•	\$246,635

\_\_\_\_\_\_\_

Estimate: BLDG 2770
Description: COST ESTIMATE

Date: 14-Oct-94

LIMITED EEAP(GLASSBid Date:

Project: Location:

FORT KNOX, KY

Sq. footage:

Job #: 94013.02 City indx:Louisville, KY 

SUN	MM 2	RY
201	.11.11.	$\tau \sim \tau$

	50					
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======				=======
U02 SITEWORK U15 MECHANICAL	554 1	\$588 \$420	\$13,405 \$16	\$2,909 \$0	\$0 \$188,191	\$16,902 \$188,627
TOTAL .	555	\$1,008	\$13,421	·\$2,909	\$188,191	\$205,529
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%		4.5	\$0	\$0	
TOTAL BEFORE COCONTINGENCY BOND	ONTINGENC 10.00% 0.00%	\$1,008	\$13,421	\$2,909	\$188,191	\$205,529 \$20,553 \$0
PROFIT	10.00%					\$20,553
JOB TOTAL						\$246,635

Estimate: BLDG 2770 Date:

14-Oct-94

Description:

INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP(GLASSBid Date:

Project: Location:

FORT KNOX, KY

Job #:

Sq. footage:

City indx:Louisville, KY

Line #

Description

Manhours Matl Labor Equipment Sub Total \_\_\_\_\_\_

0913100200 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE,

AND RECEPTACLES 3500.00 L.F.

0.00 6.79 Unit values 4.57 0.15 2.22 0.00 Totals \$7,755 521.50 \$16,004 \$0 \$0 \$23,759

A09 ELECTRICAL \$7,755 \$16,004 \$0 \$0 \$23,759 522

\_\_\_\_\_\_

Line #	Descript	ion				
	Manhours		Labor	Equipment	Sub	Total
==========	======			=======================================	======	=======
1517010650	BLACK ST	EEL RADIANT	PIPE, S	CHEDULE 40,	THREADED	
Unit values Totals	0.44	4.17 \$13,761	10.30 \$33,998	0.00	0.00	
1517011310		ICE PIPE ST 10'OC 1/2"		SCH 40 THRE	W/CPLG 3400.00	
Unit values Totals		1.64 \$5,576	2.88	0.00	0.00	
1519010320	ALUMINUM	REFLECTORS	W/HANGE		456.00	He
	0.50 228.00	39.79 \$18,144	3.80 \$1,735	0.00	456.00 0.00 \$0	
1524105040	VACUUM PI	UMP AND VEN	T PIPING	<del>}</del>	12.00	B-
Unit values Totals		738.35 \$8,860			12.00 0.00 \$0	
1552301020	CRV-100 (	GAS FIRED B	URNER 10	0 MBH & COM	BUSTION (	
Unit values Totals	1.00 72.00	860.00 \$61,920	44.06 \$3,172	0.00	0.00	
1574205220	ELECTRIC	THERMOSTAT	W/ COVE	R AND WIRING		m-
Unit values Totals	1.00 12.00		27.55 \$331	0.00		
U15 MECHANICAL	2245	\$109,161	\$50,455	\$0	\$0	\$159,616

	========	=======	======		=======	========
Line #	Description	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========		======		=======	
1631200100	HEATING SY	STEM POWE	R / CONT	ROL PANEL	12.00	Ea.
Unit values Totals	2.96 35.56	330.76 \$3,969	70.58 \$847	0.00 \$0	0.00 \$0	401.34 \$4,816
U16 ELECTRICAL	36	\$3,969	\$847	\$0	\$0	\$4,816

7 =========						
Line #	Descript:	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	======	=======				
ESTIMATE TOTAL	2803	\$120,885	\$67,306	\$0	\$0	\$188,191
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SUB MARKUP	0.00%			ŞΟ	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$120,885	\$67,306	. \$0	\$0	\$188,191 \$0 \$0 \$0
JOB TOTAL						\$188,191

\_\_\_\_\_\_

Estimate: BLDG 2770 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:

Location:

JOB TOTAL

FORT KNOX, KY Job #: 94013.02

Sq. footage:			City indx	:Louisville	, KY	
		SUMMARY				=========
	Manhours	Matl	Labor	Equipment	Sub	Total
==========	=======		. <b></b>			=======
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	2245	\$7,755 \$109,161 \$3,969	\$16,004 \$50,455 \$847	\$0 \$0 \$0	\$0 \$0 \$0	\$23,759 \$159,616 \$4,816
TOTAL	2803	\$120,885	\$67,306	\$0	\$0	\$188,191
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	<b>\$</b> 0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$120,885	\$67,306	\$0	\$0 ·	\$188,191 \$0 \$0 \$0

\$188,191

	<b>L</b>	T KNC		LIMI	FT KNOX LIMITED EEAP (GLASS)		3LASS)			
	E	30 - 1: IN	Щ	RARED	ECO - 1: INFRARED HEATING CALCULATIONS	ST.	ULATIONS			,
BUILDING NUMBER:	2770			BUILDING F OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TUR	E SETPOINT: 68	<u> </u>	PAGE	10F3
INFILTRATION LOSSES =	-	AIR CHGS	×	'	VOL (CU FT) X	29	F TEMP DIFF X 0.019	. "	4.81	MBTU / HR
FLOOR LOSSES =	2050	LINEA	Ř	LINEAR FEET OF PERIMETER	RIMETER X	29	F TEMP DIFF X 0.81	11	0.11	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	112500	112500 AREA(SF)	×	0.105	U VALUE (BTU/	29	F TEMPERATURE	II	0.79	MBTU / HR
FACE BRICK/BLK WALL =		- AREA (SF)	×	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	30089	- AREA (SF)	×	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.78	MBTU / HR
CORR MTL PNL WALL =		AREA (SF)	×	0.17	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	48360	AREA (SF)	×	1.235	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	4.00	MBTU / HR
METAL ROLL UP DOORS =	1950	- AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	. 67	F TEMPERATURE DIFFERENCE	II	0.07	MBTU / HR
MTL OVERHEAD DOORS =		AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =		- AREA (SF)	×	0.583	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG WOOD SLIDING DOOR =		AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	il	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=		AREA (SF)	×	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
					TOTAL BASEL	.I. E	TOTAL BASELINE HEAT LOSSES	11 11	10.57 11,155.10	MBTU / HR MJ/HR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

			-					PAGE 2	2 OF 3
BUILDING NUMBER:	2770	<b>番の</b> 目	JILDING I UTSIDE D EMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	XATU TURE	RE SETPOINT: 55			
INFILTRATION LOSSES =	-	AIR CHGS X 37	3780000	VOL (CU FT) X	54	F TEMP DIFF X 0.019	11	3.88	MBTU / HR
FLOOR LOSSES =	2050	LINEAR FEET OF		PERIMETER X	54	F TEMP DIFF X 0.81	11	0.09	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	112500	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0.64	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	30089	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.63	MBTU / HR
CORR MTL PNL WALL =	0	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	48360	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	3.23	MBTU / HR
METAL ROLL UP DOORS =	1950	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	. 11	90.0	MBTU / HR
MTL OVERHEAD DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	·			TOTAL ECO HEAT LOSSES	HE/	AT LOSSES	11 11	8.52 8,990.68	MBTU / HR MJ/HR

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

	•	
	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	<del>-</del>	Υ-
HTG TEMP SETPOINT (F)	89	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	10.57	8.52
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

BUILDING NUMBER 2770  GLOSSARY OF TERMS  1 MBTU = 1055 MJ  0.019=CONSTANT  81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
---

	ANNUAL HEATIN		C }	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	GREE I	ΑΥ	МЕТНО	(0		
BASELINE =	10.57	MBTU/HR X 46 SYS EFF X 6	316 37 T	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 67 TEMP DIFFERENCE	S/DAY	11	29,138.82	MBTU/YR		
	29,138.82	MBTU/YR	×	CORR FACTOR 1		11		29,138.82	MBTU/YR	
ECO - 1 =	8.52	MBTU/HR X 33 SYSEFF X 5	396 54 T	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	S/DAY	11	14,291.66	MBTU/YR		
	14,291.66	MBTU/YR	×	CORR FACTOR 1		II	ı	14,291.66	MBTU/YR	
	ECO - 1 ANNU		G EN	AL HEATING ENERGY CONSUMPTION SAVINGS	AVINGS	11 11	·	14,847.16	MBTU/YR	

	ANNUAL	<b>ANNUAL HEATING ENERGY COST</b>	ENERG	Y COST			
BASELINE =	29,138.82	MBTU/YR X 4.62	4.62	\$ /MBTU	П	= 134,621.34 \$ /YR	œ
ECO - 1 =	14,291.66	MBTU/YR X 4.62	4.62	\$ /MBTU	II	66,027.45 \$ /YR	œ
	ECO - 1 ANNL	IAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS =	11	68,593.89 <b>\$</b> /YR	œ

STUDY: 2942ECO1 LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) INSTALLATION & LOCATION: FORT KNOX REGION NOS. 4 CENSUS: 3
PROJECT NO. & TITLE: 2942ECO1 ECO-1 INFRARED HEAT
FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED ANALYSIS DATE: 10-18-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH 1. INVESTMENT A. CONSTRUCTION COST \$ 205587. B. SIOH \$ 10279.
C. DESIGN COST \$ 10279.
D. TOTAL COST (1A+1B+1C) \$ 226146. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ F. PUBLIC UTILITY COMPANY REBATE
G. TOTAL INVESTMENT (1D - 1E - 1F) 226146. 2. ENERGY SAVINGS (+) / COST (-)
DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1993 UNIT COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5) FUEL 15.6± 17.56 297 0. 8544. 0. .00 A. ELECT \$ B. DIST \$ 6.60 C. RESID \$ .00 56387. 990159. 0. 0. 0. -4190. \$ -19359. 0. \$ 0. 0. \$ 0. 4353. \$ 37028. -4190. 0. D. NAT G \$ 4.62 E. COAL \$ .00 F. LPG \$ .00 20.96 -405770. 0. 17.58 0. 16.12 0. M. DEMAND SAVINGS 14.74 584389. N. TOTAL 3. NON ENERGY SAVINGS(+) / COST(-) 2970. A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 14.74 (2) DISCOUNTED SAVING/COST (3A X 3A1) 43778. B. NON RECURRING SAVINGS(+) / COSTS(-) SAVINGS (+) DISCNT FACTR DISCOUNTED YR COST(-) OC SAVINGS(+)/ ITEM (2) (3) 5 .86 15 .63 7 .81 14 .65 3 .91 (1) COST(-)(4)11089. 9536. 1. REPAIR 6986. 11089. 2. REPĂIR2 2727. 2727. 2209. 3. REPAIR3 1773. 4. REPAIR4 63703. 57970. 5. ENVIR

- C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 122252.
- 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 44565.

\$ 91335.

d. TOTAL

- 5. SIMPLE PAYBACK PERIOD (1G/4) 5.07 YEARS
- 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 706641.
- 7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) = 3.12 (IF < 1 PROJECT DOES NOT QUALIFY)
- 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 9.14 %

78474.

\_\_\_\_\_\_ 294X AREA Date: 14-Oct-94 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: City indx:Louisville, KY MAIN GAS LINE Sq. footage: \_\_\_\_\_ Description Line # Labor Equipment Matl Manhours \_\_\_\_\_\_ SITE DEMOLITION, PAVEMENT, CONCRETE, TO 0205542200 52.00 C.Y. 24 "THICK, REINFORCED 0.00 92.52 133.64 0.00 226.16 Unit values 4.21 218.97 \$0 \$4,811 \$6,949 \$0 \$11,760 Totals 0222541900 TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD 52.00 C.Y. 0.67 Unit values 0.09 0.00 1.74 0.00 2.41 \$90 \$35 \$0 \$125 Totals 4.63 \$0 0222582800 TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D 700.00 L.F. 0.00 0.01 0.24 0.24 0.00 0.47 Unit values \$0 \$166 \$166 \$0 \$332 Totals 7.00 CONCRETE PAVING, JOINTS/FINISH, 4500 PSI 0251200400 CONCRETE, 12" THICK 78.00 S.Y. 1.07 Unit values 0.05 17.52 1.02 0.00 19.61 \$79 Totals 3.82 \$1,367 \$83 \$0 \$1,529 BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR 0260120200 13.00 C.Y. BANK 7.17 0.16 2.43 3.37 1.37 0.00 Unit values Totals 2.08 \$32 \$44 \$18 \$0 \$94 0260120500 BEDDING, PLACING IN TRENCH 13.00 C.Y. 2.41 0.67 0.00 1.74 Unit values 0.09 0.00 \$0 \$9 \$0 \$32 Totals 1.16 \$23 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. 259.60 35.47 5.91 0.00 300.98 Unit values 1.56 Totals 1.56 \$260 \$35 \$6 \$0 \$301 GAS SERVICE & DISTRIB PIPING, POLYETHYLENE, 60-0268520200 700.00 L.F. PSI 2" DIAM COIL SDR 11 0.75 2.23 0.07 1.48 0.00 0.00 Unit values \$527 \$0 \$0 \$1,563 Totals 46.90 \$1,036

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
===========		========				
U02 SITEWORK	287	\$2,186	\$6,288	\$7,262	\$0	\$15,736
1562600139	0110 111	ANCE REGUL	ATORS DO	UBLE DIAPHRAGN	1.00	Ea
Unit values Totals	0.73 0.73	<b>420.00</b> \$420	16.42 \$16	0.00 \$0	0.00	436.42 \$436
U15 MECHANICAL	1	\$420	\$16	\$0	\$0	\$436

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub .	Total
=======================================		= <b>= = =</b> = = = = :	======	========		======
ESTIMATE TOTAL	288	\$2,606	\$6,304	.\$7,262	\$0	\$16,172
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SUB MARKUP	0.00%			4.5	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$2,606	\$6,304	\$7,262	\$0	\$16,172 \$1,617 \$0 \$1,617
JOB TOTAL	20.000					\$19,406

Estimate: 294X AREA Date: 14-Oct-94
Description: COST ESTIMATE

Project: LIMITED EEAP (GLASSBID Date: Location: FORT KNOX, KY Job #:

Location: FORT KNOX, KY Job #: 94013.02 Sq. footage: MAIN GAS LINE City indx:Louisville, KY

	St	JMMARY	<b></b> .			
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======================================	========	======			=======
U02 SITEWORK U15 MECHANICAL	287 1	<b>\$2,</b> 186 <b>\$</b> 420	\$6,288 \$16	\$7,262 \$0	\$0 \$0	\$15,736 \$436
TOTAL	288	\$2,606	\$6,304	\$7,262	\$0	\$16,172
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0		•	
EQUIPT MARKUP SUB MARKUP	0.00%		70	\$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$2,606	\$6,304	\$7,262	\$0	\$16,172 \$1,617 \$0 \$1,617
JOB TOTAL						\$19,406

\_\_\_\_\_\_ 14-Oct-94 BLDG 2942 Date: COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: =========== Line # Description Equipment Sub Matl Labor Manhours \_\_\_\_\_\_ SITE DEMOLITION, PAVEMENT, CONCRETE, TO 0205542200 24"THICK, REINFORCED 10.00 C.Y. 0.00 92.52 0.00 226.16 Unit values 4.21 133.64 \$0 Totals 42.11 \$0 \$925 \$1,336 \$2,261 0205543200 SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 4"DIAMETER 500.00 L.F. Unit values 0.15 0.00 3.16 1.29 0.00 4.44 Totals 75.00 \$0 \$1,578 \$643 \$0 \$2,221 HVAC DEMO, BOILER GAS/OIL STL >150MBH 0207180380 1.00 Ea. 0.00 323.82 323.82 0.00 0.00 Unit values 12.00 \$324 \$0 \$0 \$324 \$0 Totals 12.00 0207183600 HVAC DEMO, MECH EOPT HEAVY ITEM 1.00 Ton Unit values 14.55 0.00 380.36 0.00 0.00 380.36 Totals 14.55 \$0 \$380 \$0 \$0 \$380 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 300.00 L.F. 0.07 Unit values 0.00 1.97 0.24 0.00 2.21 Totals \$0 \$592 \$71 \$0 \$663 21.30 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 100.00 Ea. Unit values 0.20 0.00 5.55 0.68 0.00 6.23 Totals 20.00 \$0 \$555 \$68 \$0 \$623 0222541900 TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD 10.00 C.Y. 1.74 0.67 0.00 0.00 2.41 Unit values 0.09 \$7 \$24 \$0 \$0 Totals 0.89 \$17 0222582800 TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D 130.00 L.F. 0.00 0.47 Unit values 0.01 0.24 0.24 0.00 Totals \$0 \$31 \$31 \$0 \$62 1.30 CONCRETE PAVING, JOINTS/FINISH, 4500 PSI 0251200400 14.50 S.Y. CONCRETE, 12" THICK

17-Oct-94		MeansDa	ita for Lot	ųs.		Page 2
Unit values Totals	0.05 0.71	17.52 \$254	1.07 \$16	1.02 \$15	0.00 \$0	19.61 \$285
0260120200		FOR PIPE IN	TRENCH SA	ND, DEAD O	R 2 F 0	C.Y.
Unit values Totals	BANK 0.16 0.40	2.43 \$6	3.37 \$8	1.37 \$3	0.00	
0260120500	BEDDING,	PLACING IN	TRENCH		2 50	G V
Unit values Totals	0.09 0.22	0.00 \$0	1.74 \$4	0.67 \$2	2.50 0.00 \$0	2.41
0266907800	CUT IN VA	LVES, W/DUC	K TIP GASK	ET, 4" DIA	METER	_
Unit values Totals	1.56 1.56	259.60 \$260	35.47 \$35	5.91 \$6	1.00 0.00 \$0	
0268520200	GAS SERVI	CE & DISTRI	B PIPING, P	OLYETHYLEN	E,60-	
Unit values Totals	PSI 2" DI 0.07 8.71	AM COIL SDR 0.75 \$98	1.48	0.00 \$0	0.00	L.F. 2.23 \$290
0268520550 .	GAS SERVI	CE&DISTRIB OAT&WRAP 1"	PIPING, SCH	40 STEEL P	LAIN 50.00	т. 🗗
Unit values Totals	0.11		2.96	0.17	0.00	

\_\_\_\_\_\_

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======		========	========
U02 SITEWORK	205	\$714	\$4,805	\$2,191	\$0	\$7,710
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See Atta	ched for 1	
Unit values. Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	35046.00	35969.40
1562600137	GAS APPLIA TYPE 1-1/4	" DIDE OF	C T3		1 00	Fa
Unit values Totals	0.53	226.00 \$226	12.10	0.00 \$0	0.00	238.10 \$238
1562600138	GAS APPLIA	NCE REGUL	ATORS DOU	BLE DIAPHR	AGM (qty)	Ea.
Unit values Totals	TYPE 1-1/2 0.62 0.00			0.00 \$0		
1562600139	GAS APPLIA		ATORS DOU	BLE DIAPHR	AGM 1.00	Fa
Unit values Totals	0.73	420.00	16.42 \$16	0.00 \$0	0.00	436.42 \$436
U15 MECHANICAL	10	\$1,406	\$191	\$0	\$35,046	\$36,643

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=========	=======	======	= = = = = = = = = =			======
ESTIMATE TOTAL	215	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353 \$4,435 \$0 \$4,435
JOB TOTAL				•		\$53,224

\_\_\_\_\_\_\_ Estimate: BLDG 2942 Date: 14-Oct-94
Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02

Sq. footage: \*\*\*\*\*\* 

City indx:Louisville, KY

																					S	U	M	M	A	R	Y	
 	_	_	_	_	_	-	_	_	-	-	_	_	-	-	_	-	_	-	-	_	-	-	_	-	-	_		 •

	Manhours	Matl	Labor	Equipment	Sub	Total		
==========	========					=======		
U02 SITEWORK U15 MECHANICAL	205 10	\$714 \$1,406	\$4,805 \$191	\$2,191 \$0	\$0 \$35,046	\$7,710 \$36,643		
TOTAL	215	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353		
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0					
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0			
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353 \$4,435 \$0 \$4,435		
JOB .TOTAL						\$53,224		

Estimate: BLDG 2942 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: Project: Location: LIMITED EEAP (GLASSBid Date: Job #: FORT KNOX, KY 94013.02 City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment Sub Total 0913100200 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, AND RECEPTACLES 370.00 L.F. Unit values 0.15 4.57 2.22 0.00 6.79 0.00 Totals 55.13 \$820 \$1,692 \$0 \$2,512 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 200.00 L.F. Unit values 0.15 2.22 4.57 0.00 6.79 0.00 Totals 29.80 \$443 \$914 \$0 \$0 \$1,357 A09 ELECTRICAL 85 \$1,263 \$0 \$2,606 \$0 \$3,869

==========	=======	=========	=======	========	=======	========
Line #	Descrip	ion				
	Manhours		Labor	Equipment		Total
===========		=======================================	=======	=======	-=======	========
	M/ CETIGO		PIPE, S	CHEDULE 40,	THREADED	, 4" DIAM
Unit values Totals	0.44 164.28		10.30 \$3,812		0.00 \$0	14.47
	GAS SERV	ICE PIPE ST	EEL GALV	SCH 40 THRI	W/CPLG 570.00	& HNGR SZD
Unit values Totals	0.13 72.39	1.64		0.00 \$0	0.00	4.52
1519010320	ALUMINUM	REFLECTORS	W/HANGE	RS		
Unit values Totals		39.79 \$2,228	3.80 \$213	0.00	56.00 0.00 \$0	Ea. 43.59 \$2,441
1524105040	VACUUM P	UMP AND VEN	T PIPING			, , = =
Unit values Totals	3.00 6.00	738.35 \$1,477			2.00 0.00 \$0	Ea. 858.50 \$1,717
1552301020	GAS FIRE	D BURNER 10	O MBH &	COMBUSTION	CHAMBER	
Unit values Totals	1.00	860.00	44.06 \$264	0.00	6.00 0.00 \$0	Ea. 904.06 \$5,424
1554510160	CO RAY-V	AC VANTAGE :	2 INFA-R	D HTG UNT,	GAS 40MBH	I
Unit values Totals		935.00 \$9,350	81.70 \$817		10.00 0.00 \$0	Ea. 1016.70 \$10,167
1556800120	CO-RAY-V	AC VANTAGE 2	VENT PI	PE		
Unit values Totals	1.60 16.00	70.00 \$700	76.50 \$765	0.00 \$0	10.00 0.00 \$0	Ea. 146.50 \$1,465
1574205220	ELECTRIC	THERMOSTAT	W/ COVER	AND WIRING		
Unit values Totals	1.00	75.00 \$900	27.55 \$331	0.00 \$0	12.00 0.00 \$0	Ea. 102.55 \$1,231
U15 MECHANICAL	345	\$22,293	\$8,081	\$0	\$0	\$30,374

=======================================	=======	=======	======		======	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========	:======	========		
1631200100	HEATING S	YSTEM POWE	er / cont	ROL PANEL	2.00	To.
Unit values	2.96	330.76	70.58		0.00	401.34
Totals	5.93	\$662	\$141	\$0	\$0	\$803
U16 ELECTRICAL	6	\$662	\$141	\$0	\$0	\$803
OTO PURCIVICAD	· ·	+ 0 0 <b>D</b>	7	• •	•	•

_==========	=======	=======	======			
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======	=======		=======================================		========
ESTIMATE TOTAL	436	\$24,218	\$10,828	\$0	\$0	\$35,046
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$24,218	\$10,828	\$0	\$0	\$35,046 \$0 \$0 \$0
JOB TOTAL						\$35,046

Estimate:

BLDG 2942

Date: 14-Oct-94

Description:
Project:

INFRARED HEATING SYSTEM COST ESTIMATE

Location:

LIMITED EEAP(GLASSBid Date: FORT KNOX, KY

Sq. footage:

Job #: 94013.02 City indx:Louisville, KY

=======================================	======= S	UMMARY	=======	========		=======
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======		======		======	
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	345	\$1,263 \$22,293 \$662	\$2,606 \$8,081 \$141	\$0 \$0 \$0	\$0 \$0 \$0	\$3,869 \$30,374 \$803
TOTAL	436	\$24,218	\$10,828	\$0	\$0	\$35,046
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0		•	
EQUIPT MARKUP SUB MARKUP	0.00%		1.	<b>\$</b> 0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$24,218	\$10,828	\$0	\$0	\$35,046 \$0 \$0 \$0
JOB TOTAL						\$35,046

Date: 14-Oct-94 BLDG 2943 Estimate: COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY \*\*\*\* Sq. footage: Description Line # Equipment Sub Labor Manhours Matl SITE DEMOLITION, PAVEMENT, CONCRETE, TO 0205542200 10.00 C.Y. 24"THICK, REINFORCED 0.00 226.16 92.52 133.64 4.21 0.00 Unit values \$0 \$2,261 \$1,336 \$925 \$0 Totals 42.11 SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 500.00 L.F. 4"DIAMETER 4.44 0.00 3.16 1.29 0.00 0.15 Unit values \$643 \$0 \$2,221 \$1,578 \$0 75.00 Totals HVAC DEMO, BOILER GAS/OIL STL >150MBH 0207180380 1.00 Ea. 323.82 0.00 323.82 0.00 0.00 Unit values 12.00 \$0 \$324 \$0 \$324 12.00 \$0 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 1.00 Ton 0.00 0.00 380.36 380.36 0.00 Unit values 14.55 \$0 \$0 \$380 \$0 \$380 14.55 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 300.00 L.F. 2.21 0.24 0.00 1.97 Unit values 0.07 0.00 \$0 \$663 \$592 \$71 \$0 Totals 21.30 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 100.00 Ea. DIAMETER PIPE 6.23 0.00 0.00 5.55 0.68 0.20 Unit values \$623 \$0 \$68 20.00 \$0 \$555 Totals TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD 0222541900 10.00 C.Y. 0.00 2.41 0.67 0.00 1.74 Unit values 0.09 \$17 \$7 \$0 \$24 \$0 0.89 Totals TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D 0222582800 130.00 L.F. 0.47 0.00 0.24 0.24 0.00 0.01 Unit values \$0 \$62 \$31 \$0 \$31 1.30 Totals CONCRETE PAVING, JOINTS/FINISH, 4500 PSI 0251200400 14.50 S.Y. CONCRETE, 12" THICK

17-Oct-94	MeansData for Lotus	Page 2
-----------	---------------------	--------

Jnit values Totals	0.05 0.71	17.52 \$254	1.07 \$16	1.02 \$15	0.00 \$0	19.61 \$285
0260120200		FOR PIPE IN	TRENCH SA	ND, DEAD O	R 2.50 C.	v
Unit values Totals	BANK 0.16 0.40	2.43 \$6	3.37 \$8	1.37 \$3	0.00 \$0	
0260120500	BEDDING,	PLACING IN	TRENCH		2 50 0	37
Unit values Totals	0.09 0.22	0.00 \$0		0.67 \$2	2.50 C. 0.00 \$0	2.41
0266907800	CUT IN VA	LVES, W/DUC	K TIP GASK	ET, 4" DIA	METER	
Unit values Totals	1.56 1.56	259.60 \$260	35.47 \$35		1.00 Ea 0.00 \$0	300.98
0268520200	GAS SERVI	CE & DISTRI	B PIPING, P	OLYETHYLEN	E,60	
Unit values Totals	PSI 2" DI. 0.07 8.71	AM COIL SDR 0.75 \$98	1.48	0.00 \$0	130.00 L. 0.00 \$0	2.23
0268520550		CE&DISTRIB				П
Unit values Totals	0.11		DIAM 2.96 \$148		50.00 L. 0.00 \$0	5.06

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=========	=======	========		
U02 SITEWORK	205	\$714	\$4,805	\$2,191	\$0	\$7,710
		RD UNT GAS				
Unit values. Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	35046.00 \$35,046	35969.40 \$35,969
1562600137	GAS APPLIA	ANCE REGULA	ATORS DOU	BLE DIAPHE	RAGM 1.00	Ea.
Unit values Totals	0.53	4" PIPE SI: 226.00 \$226	12.10 \$12	0.00 \$0	0.00 \$0	238.10 \$238
1562600138	GAS APPLIA	ANCE REGULA 2" PIPE SI	ATORS DOU	BLE DIAPHE	RAGM (atv)	Ea.
Unit values Totals	0.62 0.00	420.00	13.94	0.00 \$0	0.00	433.94 \$0
1562600139	WILL OIL D	ANCE REGUL			1 00	Ea.
Unit values Totals	0.73	420.00 \$420	16.42 \$16	0.00 \$0	0.00	436.42
U15 MECHANICAL	10	\$1,406	\$191	\$0	\$35,046	\$36,643

	=======	========			=======	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======	======	=========		
ESTIMATE TOTAL	215	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	**	
SUB MARKUP	0.00%				\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353 \$4,435 \$0 \$4,435
JOB TOTAL						\$53,224

	========		=======	=========	=======	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=========	========	=======================================	=======	========		
·						
ESTIMATE TOTAL	215	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0				
LABOR MARKUP	0.00%	Ψ.	\$0	\$0		
EQUIPT MARKUP SUB MARKUP	0.00%			γo	\$0	
	ONTINGENC	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353 \$4,435
CONTINGENCY BOND	10.00% 0.00%				•	\$0
PROFIT	10.00%					\$4,435
JOB TOTAL						\$53,224

Estimate: BLDG 2943 Date:
Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date: Date: 14-Oct-94

Location:

FORT KNOX, KY Job #: 94013.02

Sq. footage:	****	(	City indx	:Louisville	, KY ========	=======
==========	======= S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
==========	=======	=======	=======		======·	
U02 SITEWORK U15 MECHANICAL	205 10	\$714 \$1,406	\$4,805 \$191	\$2,191 \$0	\$0 \$35,046	\$7,710 \$36,643
TOTAL	215	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
CONTINGENCY BOND	ONTINGENC 10.00% 0.00% 10.00%	\$2,120	\$4,996	\$2,191	\$35,046	\$44,353 \$4,435 \$0 \$4,435
PROFIT  JOB TOTAL	10.00%					\$53,224

Estimate: BLDG 2943 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date: Project: Location: Job #: FORT KNOX, KY City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment Sub \_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 370.00 L.F. 0.00 6.79 AND RECEPTACLES 0.00 4.57 0.15 2.22 Unit values \$0 \$2,512 \$1,692 \$0 Totals 55.13 \$820 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION; 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 200.00 L.F. 0.15 2.22 4.57 0.00 0.00 0.00 6.79 Unit values \$0 \$1,357 \$0 \$914 29.80 \$443 Totals \$0 \$0 \$3,869 \$2,606 85 \$1,263 A09 ELECTRICAL

	=======	=======	======	========	=======	========
Line #	Description	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======================================	=====:	=======================================		
1517010650	W/CPLGS			CHEDULE 40,	370.00	L.F.
Unit values Totals	0.44	4.17 \$1,543		0.00 \$0		14.47 \$5,355
1517011310 .	GAS SERVICE FOR CVRG 1	E PIPE ST	EEL GALV	SCH 40 THRI	W/CPLG 8 570.00	HNGR SZD L.F.
Unit values Totals	0.13 72.39	1.64	2.88	0.00 \$0	0.00	4.52 \$2,574
1519010320	ALUMINUM F	REFLECTORS	W/HANGE	RS	56.00	Ea.
Unit values Totals	0.50 28.00	39.79 \$2,228	3.80 \$213	0.00 \$0	0.00	
1524105040	VACUUM PUN	MP AND VEN	T PIPING		2.00	Ea.
Unit values Totals	3.00 6.00	738.35 \$1,477	120.15 \$240		0.00	858.50 \$1,717
1552301020	GAS FIRED	BURNER 10	0 MBH &	COMBUSTION	CHAMBER 6.00	Ea.
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	904.06 \$5,424
1554510160	CO RAY-VA	C VANTAGE	2 INFA-	RD HTG UNT,	GAS 40MB	H Ea
Unit values Totals	4.00 40.00	935.00 \$9,350	81.70 \$817	0.00 \$0	0.00	1016.70
1556800120	CO-RAY-VA	C VANTAGE	2 VENT P	IPE	10.00	Ea.
Unit values Totals	1.60 16.00	70.00 \$700	76.50 \$765	1 A	0.00	146.50 \$1,465
1574205220	ELECTRIC '	THERMOSTAT	W/ COVE	R AND WIRIN	G 12.00	Ea.
Unit values Totals	1.00 12.00	75.00 \$900	27.55 \$331		0.00	102.55
U15 MECHANICAL	345	\$22,293	\$8,081	. \$0	\$0	\$30,374

			=======		========	=========
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========	=======		=======	
1631200100	HEATING S	YSTEM POWE	ER / CONT	ROL PANEL	2.00	Ea
Unit values Totals	2.96 5.93	330.76 \$662	70.58 \$141	0.00 \$0	0.00	401.34 \$803
U16 ELECTRICAL	6	\$662	\$141	\$0	\$0	\$803

	=======	========	=======	=========	========	=======
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========		= = _ =	=========	=======
•					•	
ESTIMATE TOTAL	436	\$24,218	\$10,828	\$0	\$0	\$35,046
SALES TAX	0.00% 0.00%	\$0 \$0		•		
MATL MARKUP LABOR MARKUP	0.00%	Şū	\$0	¢0		
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
CONTINGENCY	CONTINGENC 0.00%	\$24,218	\$10,828	\$0	\$0	\$35,046 \$0 \$0 \$0
BOND PROFIT	0.00% 0.00%					\$0
JOB TOTAL						\$35,046

Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBID Date:
Location: FORT KNOX, KY

Sq. footage:

Job #: 94013.02 City indx:Louisville, KY

=======================================	======= S	====== UMMARY	======	========		
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======			
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	85 345 6	\$1,263 \$22,293 \$662	\$2,606 \$8,081 \$141	\$0 \$0 \$0	\$0 \$0 \$0	\$3,869 \$30,374 \$803
TOTAL	436	\$24,218	\$10,828	\$0	\$0	\$35,046
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0		•	
EQUIPT MARKUP SUB MARKUP	0.00%		·	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$24,218	\$10,828	\$0	\$0	\$35,046 \$0 \$0 \$0
JOB TOTAL						\$35,046

				========		========
Estimate: Description: Project: Location: Sq. footage:		IATE EAP (GLASS) KY	-		, ку	
5q. 100tage:	========	=======	========	======		
Line #	Description	on 				
	Manhours	Matl	Labor	Equipment	Sub	Total =======
==========	=========	======				
0205542200	SITE DEMO	, REINFORC	ED.		10.00	
Unit values Totals	4.21 42.11		\$92.52	133.64 \$1,336		\$2,261
0205543200	SITE REMO	VAL, STEEL	PIPE, WELI	DED CONNECT	TION, 500.00	
Unit values Totals	0.15 75.00	0.00	3.16 \$1,578	1.29 \$643	0.00 \$0	4.44 \$2,221
0207180380	HVAC DEMO	,BOILER G	AS/OIL ST	>150MBH	1.00	
Unit values Totals	12.00 12.00	0.00 \$0	323.82 \$324		0.00 \$0	
0207183600	HVAC DEMO	,MECH EQP				Ton
Unit values Totals	14.55 29.09	0.00 \$0	380.36 \$761		0.00 \$0	
0208400600	REMOVE PI	PE INSULA	•		400.00	
Unit values Totals	0.07 28.40	0.00 \$0	1.97 \$790	0.24 · \$95	0.00 \$0	
0208401000	REMOVE IN DIAMETER	SULATION PIPE	FROM PIPE	FITTING, U	150.00	
Unit values Totals	0.20	0.00	5.55 \$833		0.00 \$0	
0222541900	TAMPING T	RENCH B'F	FILL, VIBR	ATING PLATE	E, ADD 10.00	C.Y.
Unit values Totals	0.09 0.89	0.00 \$0	1.74 \$17		0.00 \$0	
0222582800	TRENCH EX	CVTNG 40F	IP CHNTRNC	HR&BKFL 12'	'W24"D 130.00	
Unit values Totals	0.01 1.30	0.00 \$0	0.24 \$31			
0251200400	CONCRETE,	PAVING, 3	JOINTS/FIN CK	ISH, 4500 l	PSI 14.50	s.Y.

17-Oct-94		Page 2				
Unit values Totals .		17.52 \$254	1.07 \$16	. 1.02 \$15	0.00 \$0	19.61 \$285
0260120200	BEDDING, BANK	FOR PIPE IN	TRENCH SA	ND, DEAD OF	2.50 (	3. Y.
Unit values Totals	0.16 0.40	2.43 \$6	3.37 \$8	1.37 \$3	0.00	7.17
0260120500	BEDDING,	PLACING IN	TRENCH		2.50 (	7. Y.
Unit values Totals	0.09 0.22	0.00 \$0	1.74 \$4	0.67 \$2	0.00	2.41
0266907800	CUT IN VA	LVES, W/DUC	K TIP GASK	ET, 4" DIAN	METER 1.00 E	ra
Unit values Totals		259.60 \$260		5.91 \$6	0.00	300.98
0268520200		CE & DISTRI AM COIL SDR	B PIPING, P	OLYETHYLENE	E,60- 130.00 I	. <b>म</b>
Unit values Totals		0.75 \$98	11 1.48 \$192	0.00 \$0	0.00	. 2.23
0268520550	GAS SERVI	CE&DISTRIB	PIPING, SCH	40 STEEL PI	AIN 50.00 I	ъ. Т. Е.
Unit values Totals	0.11 5.35		2.96 \$148	· 0.17 \$9	0.00	

Line #	Description	ı				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	========	======			
U02 SITEWORK	236	\$714	\$5,662	\$2,249	<b>\$</b> 0	\$8,625
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	N (See Att	ached for 1.00	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	57145.00	57145.00 \$57,145
1562600137 -	GAS APPLIANTYPE 1-1/4	NCE REGUL	ATORS DOU	JBLE DIAPHR	AGM 1.00	Ea.
Unit values Totals	0.53		12.10 \$12	0.00 \$0	0.00 \$0	238.10 \$238
1562600139	GAS APPLIATYPE 2" PI	NCE REGUL PE SIZE	ATORS DO	UBLE DIAPHE	AGM 1.00	Ea.
Unit values Totals	0.73 0.73	420.00 \$420	16.42 \$16		0.00	436.42 \$436
U15 MECHANICAL	2	\$646	\$28	\$0	\$57,145	\$57,819

	========	========	======	========	=======	=======		
Line # ·	Description							
	Manhours	Matl	Labor	Equipment	Sub	Total		
=======================================	========	=======	=======		======			
ESTIMATE TOTAL	238	\$1,360	\$5,690	\$2,249	\$57,145	\$66,444		
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0			
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,360	\$5,690	\$2,249	\$57,145	\$66,444 \$6,644 \$0 \$6,644		
JOB TOTAL						\$79,733		

Estimate: BLDG 2944 Date:
Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #:

Date: 14-Oct-94

FORT KNOX, KY Job #: 94013.02

Sq. footage:	*****		City indx	:Louisville 	, KY 	
=============	:=======: SI	JMMARY				
	Manhours	Matl	Labor	Equipment	Sub .	Total
==========	=======:	=======	======	=======	======	
U02 SITEWORK U15 MECHANICAL	236 2	\$71 <b>4</b> \$646	\$5,662 \$28	\$2,249 . \$0	\$0 \$57,145	\$8,625 \$57,819
TOTAL	238	\$1,360	\$5,690	\$2,249	\$57,145	\$66,444
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	, \$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	CONTINGENC 10.00% 0.00% 10.00%	\$1,360	\$5,690	\$2,249	\$57,145	\$66,444 \$6,644 \$0 \$6,644
JOB TOTAL						\$79,733

14-Oct-94 Estimate: BLDG 2944 Date: INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: . Job #: FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Description Labor Equipment Sub Manhours Matl 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 925.00 L.F. AND RECEPTACLES 0.00 0.00 4.57 2.22 Unit values 0.15 \$0 \$0 \$6,279 \$4,230 137.83 \$2,049 Totals CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 100.00 L.F. 6.79 2.22 4.57 0.00 0.00 Unit values 0.15 \$0 \$0 \$679 \$457 14.90 \$222 Totals \$0 \$6,958 \$0 \$2,271 \$4,687 A09 ELECTRICAL 153

=======================================	=======	=======	=======	=========	:======	========
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	:=======	=======	======	========		
1517010650	W/CDI.CC			HEDULE 40,	925.00	ь.ғ.
Unit values Totals	0.44 410.70	4.17 \$3,857	10.30 \$9,530	0.00 \$0	0.00 \$0	14.47 \$13,387
1517011310	GAS SERVI	CE PIPE ST 10'OC 1/2"	EEL GALV	SCH 40 THRI	W/CPLG 0	L.F.
Unit values Totals .	0.13 130.18	1.64 \$1,681	2.88 \$2,947	. 0.00	0.00 \$0	
1519010320	ALUMINUM	REFLECTORS	w/HANGER	RS	136.00	Ea.
Unit values Totals	0.50 68.00	39.79 \$5,411	3.80 \$517	0.00 \$0	0.00	43.59 \$5,928
1524105040	VACUUM PU	MP AND VEN	T PIPING		4.00	Ea.
Unit values Totals	3.00 12.00	738.35 \$2,953	120.15 \$481	0.00 \$0	0.00	858.50 \$3,434
1552301020	GAS FIRED	BURNER 10	00 MBH &	COMBUSTION	CHAMBER 16.00	Ea.
Unit values Totals	1.00	860.00 \$13,760	44.06 \$705	0.00 \$0		904.06 \$14,465
1554510160	CO RAY-VA	C VANTAGE	2 INFA-F	RD HTG UNT,	GAS 40MB 5.00	H Fa
Unit values Totals	4.00	935.00 \$4,675	81.70 \$409	0.00 \$0	0.00	
1556800120	CO-RAY-VA	C VANTAGE	2 VENT P	IPE	5.00	Ea
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382	· 0.00 \$0	0.00	
1574205220	ELECTRIC	THERMOSTAT	W/ COVE	R AND WIRIN	G 9.00	Fa
Unit values Totals	1.00 9.00	75.00 \$675	27.55 \$248	0.00 \$0	0.00 \$0	102.55
U15 MECHANICAL	674	\$33,362	\$15,219	\$0	\$0	\$48,581

===========					=======	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======================================				
1631200100	HEATING S	YSTEM POW	er / conti	ROL PANEL	4 00	R-a
Unit values Totals	2.96 11.85	330.76 \$1,323	70.58 \$282	0.00 \$0	4.00 0.00 \$0	401.34 \$1,605
U16 ELECTRICAL	12	\$1,323	\$282	\$0	\$0	\$1,605

	=======	========			=======	=======
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======	======	======			
ESTIMATE TOTAL	839	\$36,956	\$20,188	\$0	\$0	\$57,144
SALES TAX MATL MARKUP	0.00%	\$0 \$0	* ~		•	
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0 <sup>°</sup>	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$36,956	\$20,188	. \$0	\$0	\$57,144 \$0 \$0 \$0
JOB TOTAL						\$57,144

Estimate: BLDG 2944 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBID Date: Date: 14-Oct-94

Project:

FORT KNOX, KY

Location:

Job #: 94013.02 City indx:Louisville, KY

Sq.	footage:			city inax	:Louisville,	KI	
===		======= S	UMMARY				
		Manhours	Matl	Labor	Equipment	Sub	Total
===	========			======			
A09 U15 U16	MECHANICAL	153 674 12	\$2,271 \$33,362 \$1,323	\$4,687 \$15,219 \$282	\$0 \$0 \$0	\$0 \$0 \$0	\$6,958 \$48,581 \$1,605
TOT	AL	839	\$36,956	\$20,188	\$0	\$0	\$57,144
MAT	ES TAX L MARKUP OR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQU	IPT MARKUP MARKUP	0.00%		·	\$0	\$0	
CON BON	TINGENCY	ONTINGENC 0.00% 0.00% 0.00%	\$36,956	\$20,188	\$0	\$ <u>0</u>	\$57,144 \$0 \$0 \$0
JOB	TOTAL						\$57,144

# **ECO - 1: INFRARED HEATING CALCULATIONS**

						-		PAGE 1 OF	1 OF 3
BUILDING NUMBER:	2942	•	BUILDING I OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE JRE	SETPOINT: 66	<u> </u>		
INFILTRATION LOSSES =	-	AIR CHGS	X 388428	VOL (CUFT) X	65 F	F TEMP DIFF X 0.019	11	0.48	MBTU / HR
FLOOR LOSSES =	580	LINEAF	LINEAR FEET OF PERIMETER	RIMETER X	65 F	F TEMP DIFF X 0.81	<b>11</b>	0.03	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =		17220 AREA (SF)	X 0.105	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II.	0.12	MBTU / HR
FACE BRICK/BLK WALL =	3895	AREA (SF)	X 0.14	U VALUE (BTU/ HR - SF - F) X	92	F TEMPERATURE DIFFERENCE	ti	0.04	MBTU / HR
8" CINDER BLOCK WALL =		AREA (SF)	X 0.389	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
CORR MTL PNL WALL =	11832	AREA (SF)	X 0.17	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	H	0.13	MBTU / HR
CLR SGL PANE WINDOWS =	62	AREA (SF)	X 1.235	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	ji	0.00	MBTU / HR
METAL VERT LFT DOORS =	2048	ARĖA (SF)	X 0.2	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.03	MBTU / HR
MTL OVERHEAD DOORS =	896	AREA (SF)	X 0.2	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II	0.01	MBTU / HR
WOOD GLAZED O'HEAD DR =		AREA (SF)	X 0.583	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF)	X 0.56	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	150	AREA (SF)	X 0.56	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
MTL/ GLAZED PERSONNEL=		AREA (SF)	X 0.615	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR

MBTU / HR MJ/HR

0.84 889.02

11 11

TOTAL BASELINE HEAT LOSSES

# **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAGE 2 OF	2 OF 3
BUILDING NUMBER:	2942	801	JILDING H UTSIDE DE	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUR TURE	RE SETPOINT: 55	<u> </u>		
INFILTRATION LOSSES =	<del>-</del>	AIR CHGS X 3	388428	VOL (CUFT) X 54		F TEMP DIFF X 0.019	n	0.40	MBTU / HR
FLOOR LOSSES =	580	LINEAR FEET OF	T OF PEI	PERIMETER X	54 F	F TEMP DIFF X 0.81	II.	0.03	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	17220	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.10	MBTU / HR
FACE BRICK/BLK WALL =	3895	AREA (SF) X	0.14	U VALUE (BTU/ HR - SF - F) X	24	F TEMPERATURE DIFFERENCE	#1	0.03	MBTU / HR
8" CINDER BLOCK WALL =	0	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CORR MTL PNL WALL =	11832	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	. 45	F TEMPERATURE DIFFERENCE	11	0.11	MBTU / HR
CLR SGL PANE WINDOWS =	62	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR
METAL ROLL UP DOORS =	2048	AREA (SF) X	0.2	U· VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	. 11	0.02	MBTU / HR
MTL OVERHEAD DOORS =	968	AREA (SF) X	0.2	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.01	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	u	0.00	MBTU / HR
METAL PERSONNEL DR=	150	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF) X	0.615	'U VALUE (BTU/ HR - SF - F) X	25	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	·			TOTAL ECO HEAT LOSSES	HE/	AT LOSSES	H H	0.70 738.57	MBTU / HR MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

	BASELINE	ECO - 1	
SYSTEM EFFICIENCY	%09	%06	
OUTSIDE DESIGN TEMP (F)	-	-	
HTG TEMP SETPOINT (F)	99	22	
HEATING DEGREE DAYS	4616	3396	
TOTAL HEAT LOSSES (MBTU / HR)	0.84	0.70	
\$ /MBTU -FUEL OIL	\$6.60	\$6.60	J
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
\$ /MBTU -PPG	\$10.84	\$10.84	

BUILDING NUMBER	2942
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
81 = CONSTANT FOR SLAE	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRIC	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

A	ANNUAL HEATIN	TING ENER	GY C	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	GREE [	ΑΥ	METHO	(a	
BASELINE =	0.84	MBTU/HR X SYS EFF X	4616 65	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 65 TEMP DIFFERENCE	RS/DAY	11	2,393.70	MBTU/YR	
	2,393.70	MBTU/YR	×	CORR FACTOR 1		П		2,393.70	MBTU/YR
ECO - 1=	M 07.0	MBTU/HR X SYS EFF X	3396 54	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	IRS/DAY	II	1,174.03	MBTU/YR	
	1,174.03	MBTU/YR	×	CORR FACTOR 1		11		1,174.03	MBTU/YR
	ECO - 1	ANNUAL HEATI	NG EI	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	SAVINGS	11 11		1,219.67	MBTU/YR MJ/YR

	ANNOAL	<b>ANNUAL HEATING ENERGY COST</b>	NERG	Y COST			
BASELINE =	2,393.70	2,393.70 MBTU/YR X 6.6	6.6	\$ /MBTU	П	= 15,798.41 \$ /YR	\$ MR
ECO - 1 =	1,174.03	MBTU/YR X 4.62	4.62	\$ /MBTU	II	5,424.03 \$ /YR	_\$ /YR
	ECO - 1 ANNI	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 10.374.38 \$ //R	NERGY	COST SAVING	II	10.374.38	S ∧R

# **ECO - 1: INFRARED HEATING CALCULATIONS**

								-	PAGE 1	1 OF 3
	BUILDING NUMBER:	2943	1	BUILDING H OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	NTURE URE	E SETPOINT: 66	<u> </u>		
	INFILTRATION LOSSES = _	-	AIR CHGS	X 388428	VOL (CUFT) X	65	F TEMP DIFF X 0.019	11	0.48	MBTU / HR
	FLOOR LOSSES=_	580	LINEAR	LINEAR FEET OF PERIMETER	RIMETER X	65	F TEMP DIFF X 0.81	11	0.03	MBTU / HR
	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	17220	17220 AREA (SF) X	ζ 0.105	U VALUE (BTU/	65	F TEMPERATURE	. 11	. 0.12	MBTU / HR
	FACE BRICK/BLK WALL =	3895	- AREA (SF) X	ζ 0.14	U VALUE (BTU/ HR-SF-F) X	65	DIFFERENCE F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
	8" CINDER BLOCK WALL =		AREA (SF) X	( 0.389	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
	CORR MTL PNL WALL =	11832	AREA (SF) X	۲۰۰۵ ۲	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	11	0.13	MBTU / HR
	CLR SGL PANE WINDOWS =	62	_AREA(SF) X	( 1.235	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	. 11	0.00	MBTU / HR
•	METAL VERT LFT DOORS =	2048	_AREA(SF) X	۲ 0.2	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
	MTL OVERHEAD DOORS =	896	_ AREA (SF) X	ζ 0.2	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
	WOOD GLAZED O'HEAD DR =		AREA (SF) X	X 0.583	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	LG MTL SLIDING DOOR =		_ AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	METAL PERSONNEL DR=	150	AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
D. 65	MTL/ GLAZED PERSONNEL=		- AREA (SF) X -	( 0.615	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	. 11	0.00	MBTU / HR
1 1										

MBTU / HR MJ/HR

0.84 889.02

. 11. 11

**TOTAL BASELINE HEAT LOSSES** 

# **ECO - 1: INFRARED HEATING CALCULATIONS**

									PAGE 2 OF	2 OF 3
BUILDING NUMBER:	2943		m O F	UILDING UTSIDE I EMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATU TUR	RE SETPOINT: 55	<u> </u>		
INFILTRATION LOSSES =	-	AIR CHGS	×	388428	VOL (CU FT) X	54	F TEMP DIFF X 0.019	11	0.40	MBTU/HR
FLOOR LOSSES =	580	LINEAR FEET OF	F		PERIMETER X	54	F TEMP DIFF X 0.81	II .	0.03	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	17220	AREA (SF)	×	0.105	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.10	MBTU / HR
FACE BRICK/BLK WALL =	3895	AREA (SF)	×	0.14	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0.03	MBTU / HR
8" CINDER BLOCK WALL =	0	AREA (SF)	×	0.389	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
CORR MTL PNL WALL =	11832	AREA (SF)	×	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.11	MBTU / HR
CLR SGL PANE WINDOWS =	62	AREA (SF)	×	1.235	U VALUE (BTU/ HR - SF - F) X	. 24	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL ROLL UP DOORS =	2048	AREA (SF)	×	0.2	U VALUE (BTU/ HR - SF - F) X	54	F·TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
MTL OVERHEAD DOORS =	896	AREA (SF)	×	0.2	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.01	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF)	×	0.583	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
LG WOOD SLIDING DOOR =	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	150	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF)	×	0.615	U VALUE (BTU/ HR - SF - F) X	. 54	F TEMPERATURE DIFFERENCE	ti I	0.00	MBTU / HR
					TOTAL ECC	뽀	TOTAL ECO HEAT LOSSES	11 11	0.70 738.57	MBTU / HR MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	-
HTG TEMP SETPOINT (F)	99	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0.84	0 2 0
(MBTU / HR)	5	5
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

BUILDING NUMBER	2943
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SL	81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPI	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FRO	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

A	NNUAL HEA	TING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	<b>JAY METH</b>	( <u>a</u> o	
BASELINE =	0.84	MBTU / HR X 4616 SYS EFF X 65	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 65 TEMP DIFFERENCE	= 2,393.70	MBTU/YR	
	2,393.70	MBTU/YR X	CORR FACTOR 1	II	2,393.70	MBTU/YR
ECO - 1 =	0.70	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	= 1,174.03	MBTU/YR	
	1,174.03	MBTU/YR X	CORR FACTOR 1	. 11	1,174.03	MBTU/YR
	ECO - 1 ANNU	ANNUAL HEATING E	AL HEATING ENERGY CONSUMPTION SAVINGS	я п	1,219.67 1,286,748.14	MBTU/YR MJ/YR

		ANNUAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST			
BASELINE	IN II	2,393.70	MBTU/YR X 6.6	6.6	\$ /MBTU	11	= 15,798.41 \$ /YR	\$ /YR
ECO -	11	1,174.03	MBTU / YR X 4.62	4.62	\$ /MBTU	n .	5,424.03 \$ MR	\$ /YR
		ECO - 1 ANNU	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS =	ENERGY	COST SAVING	II	10,374.38 \$ /YR	\$ /YR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

									PAGE	PAGE 1 OF 3
BUILDING NUMBER:	2944		-	BUILDING F OUTSIDE D TEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TUR	E SETPOINT: 66 1 65	<b>ու ու 'ու</b> -		
INFILTRATION LOSSES =	-	AIR CHGS	×	687904	VOL (CUFT) X	65	F TEMP DIFF X 0.019	ii l	0.85	MBTU / HR
FLOOR LOSSES = _	684	LINEAL	Я П	R FEET OF PERIMETER	RIMETER X	65	F TEMP DIFF X 0.81	11	0.04	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	21497	AREA (SF)	· ×	0.105	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	II	0.15	MBTU / HR
FACE BRICK/BLK WALL =	5418	AREA (SF)	×	0.14	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	• 11	0.05	MBTU / HR
8" CINDER BLOCK WALL =		AREA (SF)	×	0.389	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	. #	0.00	MBTU / HR
CORR MTL PNL WALL =	15301	AREA (SF)	×	0.17	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	II	0.17	MBTU / HR
CLR SGL PANE WINDOWS =	63	AREA (SF)	×	1.235	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
METAL VERT LFT DOORS =	5120	- AREA (SF)	×	0.2	U VALUE (BTU/ HR-SF-F) X		F TEMPERATURE DIFFERENCE	ti	0.07	MBTU / HR
MTL OVERHEAD DOORS =		AREA (SF)	×	0.2	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	H	00.00	MBTU / HR
WOOD GLAZED O'HEAD DR =		– AREA (SF)	×	0.583	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	65	F TEMPERATURE DIFFERENCE	п	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=		 AREA (SF) 	×	0.615	U VALUE (BTU/ HR - SF - F) X	65	F TEMPERATURE DIFFERENCE	21	0.00	MBTU / HR
					TOTAL BASEI	Ä.	TOTAL BASELINE HEAT LOSSES	81 - <b>11</b>	1.32 1,395.01	MBTU / HR MJ/HR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 2 OF 3

BUILDING NUMBER:	2944	BUILD OUTS TEMP!	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATURE TURE E	SETPOINT: 55	_ _ <del>Մ. Մ. Մ.</del>		
INFILTRATION LOSSES =	-	AIR CHGS X 687904	VOL (CU FT)	X 54 FT	F TEMP DIFF X 0.019	II I	0.71	MBTU / HR
FLOOR LOSSES =	684	LINEAR FEET OF	PERIMETER X	54 F T	F TEMP DIFF X 0.81	H	0.03	MBTU / HR
SURFACE HEAT LOSSES			H ( ) L : 1 × 2 × 2 · 1				•	•
FLAT BUILT UP ROOF =	21497	AREA (SF) X 0.105	_	54	r lemperaloke Difference	н	0.12	MBTU / HR
FACE BRICK/BLK WALL =	5418	AREA (SF) X 0.14	U VALUE (BTU/ HR-SF-F) X	54 F	TEMPERATURE DIFFERENCE	Ħ	0.04	MBTU / HR
8" CINDER BLOCK WALL =	0	AREA (SF) X 0.389	9 U VALUE (BTU/ HR-SF-F) X	54 F	: TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU/HR
CORR MTL PNL WALL =	15301	AREA (SF) X 0.17	U VALUE (BTU/ HR-SF-F) X	54 F	F TEMPERATURE DIFFERENCE	II	0.14	MBTU / HR
CLR SGL PANE WINDOWS =	63	AREA (SF) X 1.235	5 U VALUE (BTU/ HR-SF-F) X	54 F	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
. METAL VERT LFT DOORS =	5120	AREA (SF) X 0.2	U VALUE (BTU/ HR - SF - F) X	54 F	F TEMPERATURE DIFFERENCE	. 11	90.0	MBTU/HR
MTL OVERHEAD DOORS =	0	AREA (SF). X 0.2	U VALUE (BTU/ HR - SF - F) X	54 F	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X 0.583	3 U VALUE (BTU/ HR-SF-F) X	54 F	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X 0.56	U VALUE (BTU/ HR-SF-F) X	54 F	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X 0.56		54 F	F TEMPERATURE DIFFERENCE	И	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	0	AREA (SF) X 0.615	5 U VALUE (BTU/ HR - SF - F) X	54 F	F TEMPERATÛRE DIFFERENCE	н	0.00	MBTU / HR
			TOTAL ECO HEAT LOSSES	) НЕАТ	LOSSES	11 11	1.10 1,158.93	MBTU / HR MJ/HR

## FT KNOX LIMITED EEAP (GLASS)

## **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

	BASELINE	ECO - 1	BUILDING
SYSTEM EFFICIENCY	%09	%06	
OUTSIDE DESIGN TEMP (F)	-	-	1 MBTU = 1055
HTG TEMP SETPOINT (F)	99	55	0.019=CONST/
HEATING DEGREE DAYS	4616	3396	.81 = CONSTAI
TOTAL HEAT LOSSES	4 00		CORR FACTOR
(MBTU / HR)	76.1	2	65 F DEGREE-
\$ /MBTU -FUEL OIL	\$6.60	\$6.60	
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
S MRTU -PPG	\$10.84	\$10.84	

BUILDING NUMBER	2944
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLA	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIR	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

	ANNUAL HEA	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	CONSUMPTI	ON (DEGREE I	JAY	METHO	<u>(</u>	
BASELINE =	1.32	MBTU / HR X 461 SYS EFF X 65	TU / HR X 4616 DEGREE DAYS X 24 HRS/DAY EFF X 65 TEMP DIFFERENCE	X 24 HRS/DAY CE	11	3,756.11	MBTU/YR	
	3,756.11	MBTU/YR X	CORR FACTOR	F	п		3,756.11	MBTU/YR
ECO - 1=	1.10	MBTU/HR X 339 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	X 24 HRS/DAY CE	н	1,842.25	MBTU/YR	
	1,842.25	MBTU/YR X	. CORR FACTOR	F	11	'	1,842.25	MBTU/YR
	ECO - 1 ANNU		ENERGY CONSU	AL HEATING ENERGY CONSUMPTION SAVINGS	11 11		1,913.86 2,019,121.94	MBTU/YR MJ/YR

	ANNUAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST			
BASELINE =	3,756.11	MBTU/YR X 6.6	6.6	\$ /MBTU	п	= 24,790.34 \$ /YR	\$ MR
ECO - 1 =	1,842.25	MBTU/YR X 4.62	4.62	\$/MBTU	11	8,511.21 \$ MR	* //R
	ECO - 1 ANNI	JAL HEATING E	:NERGY (	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 16,279,13 \$ //R	H	16,279.13	\$ MR

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

ALLATION & LOCATION FORT MAY

THE PROGRAM (ECIP)

LCCID 1.080 REGION NOS. 4 CENSUS: 3 INSTALLATION & LOCATION: FORT KNOX PROJECT NO. & TITLE: 6113ECO1 ECO-1 INFRARED HEAT

FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED ANALYSIS DATE: 10-18-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH

7547.

- 1. INVESTMENT 457980. A. CONSTRUCTION COST 22899. B. SIOH 22899. C. DESIGN COST D. TOTAL COST (1A+1B+1C) \$ 503778. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ F. PUBLIC UTILITY COMPANY REBATE 0. \$ G. TOTAL INVESTMENT (1D - 1E - 1F) 503778. 2. ENERGY SAVINGS (+) / COST (-) DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1993 SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED UNIT COST SAVINGS(3) FACTOR (4) SAVINGS (5) \$/MBTU(1) MBTU/YR(2) . FUEL 0. 15.61 A. ELECT \$ .00 0. 97756. 14811. 17.56 1716591. B. DIST \$ 6.60 C. RESID S .00 19.97 0. 0. D. NAT G \$ 4.62 -7265. -33562. 20.96 -703465. .00 E. COAL \$ 0. 0. 17.58 .00 0. F. LPG 0. 16.12
- 3. NON ENERGY SAVINGS(+) / COST(-)

5. SIMPLE PAYBACK PERIOD (1G/4)

M. DEMAND SAVINGS

N. TOTAL

3960. A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 14.74 (2) DISCOUNTED SAVING/COST (3A X 3A1) 58370.

0.

64194.

14.74

B. NON RECURRING SAVINGS(+) / COSTS(-)

		SAVINGS	S(+) YR	DISCNT	DISCOUNTED
	ITEM	COST	· . ·	FACTR	SAVINGS(+)/
		[]	L) (2)	(3)	COST(-)(4)
1.	REPAIR	\$ 4790	)3. 5	.86	41197.
2.	REPAIR2	\$ 4790	3. 15	.63	30179.
3.	REPAIR3	\$ 363	36. 7	.81	2945.
4.	REPAIR4	\$ 363	36. 14	.65	2364.
5.	ENVIR	\$ 8826	51. 3	.91	<b>\$0318.</b>
đ.	TOTAL	\$ 19134	11.		157003.

- C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 215373.
- 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 77721.
- \$ 1228500. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)
- 7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) =2.44 (IF < 1 PROJECT DOES NOT QUALIFY)
- 7.80 % 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

0.

0.

0.

0.

1013126.

6.48 YEARS

					=======	
Estimate: Description: Project: Location: Sq. footage:	LIMITED E FORT KNOX MAIN GAS	MATE EAP(GLASSB , KY J LINE C		06-Aug-94 94013.02 Louisville,		========
Line #	Description					
	Manhours	Matl 		Equipment =======	Sub	Total
2=========						
0222541900	TAMPING T	RENCH B'FI	LL, VIBRA	TING PLATE,	ADD 122.50	С. Ү.
Unit values Totals	0.09 10.90	0.00 \$0	1.74 \$213	0.67 \$82	0.00	2.41 \$295
0222582800	TRENCH EX	CVTNG 40HP	CHNTRNCH	R&BKFL 12"W	24"D 1650.00	L.F.
Unit values Totals	0.01 16.50	0.00 \$0	0.24 \$390	0.24 \$390	0 00	0.47 \$780
0260120200	BEDDING, S	FOR PIPE I		SAND, DEAD	OR 31.00	C.Y.
Unit values Totals	0.16 4.96	2.43 \$75		1.37 \$42	0.00 \$0	7.17 \$222
0260120500	BEDDING,	PLACING IN	TRENCH		21.00	
Unit values Totals	0.09 2.76	0.00 \$0	1.74 \$54	0.67 . \$21	31.00 0.00 \$0	2.41 \$75
0266907800	CUT IN VA	LVES, W/DU	CK TIP GA	SKET, 4" DI		
Unit values Totals	1.56 1.56	259.60 \$260	35.47 \$35	5.91 \$6	1.00 0.00 \$0	Ea. 300.98 \$301
0268520350				POLYETHYLEN	E,60P- 1650.00	T. R
Unit values Totals	0.11 178.20	SDR11,CPLG 2.43 \$4,016	2.45	0.41 \$678	0.00	
U02 SITEWORK	215	\$4,351	\$4,834	\$1,219	\$0	\$10,404

		=======	=======			
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======	=======			=======	
1562600142			LATORS DO	UBLE DIAPHRA		77_
Unit values	2.00	1450.00	40.85	0.00	1.00	1490.85
Totals	2.00	\$1,450	\$41	\$0	\$0	\$1,491
U15 MECHANICAL	2	\$1,450	\$41	\$0	\$0	\$1,491

	========	========	=======		========	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======================================			= = = = = = = = = = = = = = = = = = =		
ESTIMATE TOTAL	217	\$5,801	\$4,875	\$1,219	\$0	\$11,895
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00% 0.00%	\$0	\$0			
EQUIPT MARKUP	0.00%		·	\$0	<b></b>	
SUB MARKUP	0.00%				\$0	
TOTAL BEFORE CONTINGENCY	ONTINGENC 10.00%	\$5,801	\$4,875	\$1,219	\$0	\$11,895 \$1,190
BOND	0.00%					\$0
PROFIT	10.00%					\$1,190
JOB TOTAL						\$14,274

\_\_\_\_\_\_

Estimate: 61XX AREA

Date:

06-Aug-94

Description:

COST ESTIMATE

Project:

LIMITED EEAP(GLASSBid Date:

Location:

94013.02 Job #:

FORT KNOX, KY MAIN GAS LINE Sq. footage: 

City indx:Louisville, KY

SUMMARY

	50	JIMMINICI				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======		======			
U02 SITEWORK U15 MECHANICAL	215 2	\$4,351 \$1,450	\$4,834 \$41	\$1,219 \$0	\$0 \$0	\$10,404 \$1,491
TOTAL	217	\$5,801	\$4,875	\$1,219	\$0	\$11,895
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0		•	
EQUIPT MARKUP SUB MARKUP	0.00%		Ψ°	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$5,801	\$4,875	\$1,219	\$0	\$11,895 \$1,190 \$0 \$1,190
JOB TOTAL						\$14,274

	FORT KNOX	MATE EEAP (GLASSE K, KY EAS LINE (	)OD #:	06-Aug-94 94013.02 Louisville	, ку	
=======================================		:=======				
Line # .	Descripti	.on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	:=======	========	=======	=======	
0222541900	TAMPING T	RENCH B'F	LL, VIBR	ATING PLATE	, ADD 44.00	C.Y.
Unit values Totals	0.09 3.92	0.00 \$0	1.74 \$76	0.67 \$29	0.00	2.41 \$105
0222582800	TRENCH EX	CVTNG 40H	CHNTRNC	R&BKFL 12"	724"D 590.00	T. F
Unit values Totals	0.01 5.90	0.00 \$0	0.24 \$139		0.00	0.47 \$278
0222700100	HORZ BORN	IG, .5"WALI	, 3"DIA (	CASING, ROCI	XY SOIL 410.00	T. F
Unit values Totals		15.58 \$6,386	0.62 \$253	0.10 \$42	10000.00	10016.30
0260120200	BEDDING, BANK	FOR PIPE		SAND, DEAD	11.00	C.Y.
Unit values Totals	0.16 1.76	2.43 \$27	3.37 \$37	1.37 · \$15	0.00	7.17 \$79
0260120500	BEDDING,	PLACING IN	N TRENCH		11.00	CV
Unit values Totals	0.09 0.98	0.00 \$0			0.00	2.41
0266907800	CUT IN V	LVES, W/DU	JCK TIP GA	ASKET, 4" D	IAMETER 1.00	Ea.
Unit values Totals	1.56 1.56	259.60 \$260	35.47 \$35	5.91 \$6	0.00	300.98 \$301
0268520200		CE & DISTR		, POLYETHYLI	ENE,60- 1000.00	L.F.
Unit values Totals	0.07 67.00	0.75 \$753	1.48 \$1,480	0.00 \$0	0.00	2.23 \$2,233
U02 SITEWORK	93	\$7,426	\$2,039	\$238	\$10,000	\$19,703

=======================================	=======	=======			======:	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=========	======	======	=======		-========
1562600139	GAS APPLIA		LATORS DO	UBLE DIAPHRA		
Unit values Totals	TYPE 2" PI 0.73 0.73	PE SIZE 420.00 \$420	16.42 \$16	0.00 \$0	1.00 0.00 \$0	436.42 \$436
U15 MECHANICAL	. 1	\$420	\$16	\$0	\$0	\$436

=======================================	========	-=======	=======		=========	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
		=======				
				•		
ESTIMATE TOTAL	94	\$7,846	\$2,055	\$238	\$10,000	\$20,139
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		4.5	\$0	\$0	
CONTINGENCY	ONTINGENC	\$7,846	\$2,055	\$238	\$10,000	\$20,139 \$2,014 \$0
BOND PROFIT	0.00% 10.00%					\$2,014
JOB TOTAL						\$24,167

\_\_\_\_\_\_

Estimate: 611X AREA
Description: COST ESTIMATE

Date:

06-Aug-94

Project:

LIMITED EEAP(GLASSBid Date: FORT KNOX, KY

Job #: 94013.02

Location:

JOB TOTAL

Location: FORT KNOX, KY Job #: 94013.02 Sq. footage: SUBMAIN GAS LINE City indx:Louisville, KY SUMMARY Matl Labor Equipment Sub Manhours \_\_\_\_\_\_ \$19,703 U02 SITEWORK 93 \$7,426 \$2,039 \$238 \$10,000 \$420 \$0 U15 MECHANICAL 1 \$16 \$0 \$436 TOTAL 94 \$7,846 \$2,055 \$238 \$10,000 \$20,139 SALES TAX \$0 0.00% \$0 MATL MARKUP 0.00% LABOR MARKUP 0.00% \$0 EQUIPT MARKUP \$0 0.00% \$0 SUB MARKUP 0.00% TOTAL BEFORE CONTINGENC \$2,055 \$238 \$10,000 \$20,139 \$7,846 CONTINGENCY 10.00% \$2,014 BOND 0.00% \$0 PROFIT 10.00% \$2,014

\$24,167

14-Oct-94 Date: BLDG 6113 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: 6900.00 Description Labor Equipment Manhours Matl \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 320.00 L.F. 4"DIAMETER 0.00 0.15 0.00 3.16 1.29 Unit values \$411 \$0 48.00 \$0 \$1,010 \$1,421 Totals 0207183600 HVAC DEMO, MECH EOPT HEAVY ITEM 0.75 Ton 0.00 380.36 0.00 380.36 0.00 14.55 Unit values \$0 \$0 \$285 10.91 \$285 Totals \$0 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 0.00 1.97 0.24 0.00 2.21 Unit values 0.07 \$40 \$0 \$376 \$336 \$0 Totals 12.07 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 50.00 Ea. DIAMETER PIPE 0.00 0.00 5.55 0.68 6.23 0.20 Unit values 10.00 \$0 \$278 \$34 \$0 \$312 Totals 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. 259.60 5.91 0.00 300.98 Unit values 1.56 35.47 \$260 \$35 \$6 \$0 \$301 Totals 1.56 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values 0.11 1.92 2.96 0.17 0.00 5.06 \$253 \$0 Totals 5.35 \$96 \$148 \$9 \$500 \$0 \$2,948 U02 SITEWORK 88 \$356 \$2,092

===================================	========	=======	=======	========	========	========
Line #	Description	1				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	==========	=======	=======		=======	<b>-</b>
1554510245	HTG INFA-RI	UNT GAS	ELEC IGN	N (See Att	ached for	Breakdown) LS
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	21687.00 \$21,687	
1562600137	GAS APPLIAN			JBLE DIAPHR		_
Unit values Totals	TYPE 1-1/4" 0.53 0.53		ZE 12.10 \$12	0.00 \$0	1.00 0.00 \$0	
U15 MECHANICAL	9	\$986	\$175	. \$0	\$21,687	\$22,848

	========	=======	=======	=========	========	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=========	=======	=======	========	========	========
				•		
ESTIMATE TOTAL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796
SALES TAX	0.00% 0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00%	ŞU	\$0	20		
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
CONTINGENCY	CONTINGENC	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0
BOND PROFIT	0.00% 10.00%					\$2,580
JOB TOTAL						\$30,955

Estimate:

BLDG 6113 Date: 14-Oct-94

Description: Project:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY Job #: 94013.02

Location: Sq. footage: 6900.00

JOB TOTAL

City indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ \$356 \$2,092 \$500 \$2,948 88 U02 SITEWORK \$21,687 \$22,848 9 \$986 \$175 \$0 U15 MECHANICAL \$2,267 \$500 \$21,687 \$25,796 97 \$1,342 TOTAL SALES TAX 0.00% \$0 0.00% \$0 MATL MARKUP LABOR MARKUP 0.00% \$0 \$0 0.00% EQUIPT MARKUP \$0 0.00% SUB MARKUP \$500 \$25,796 \$21,687 TOTAL BEFORE CONTINGENC \$1,342 \$2,267 \$2,580 CONTINGENCY 10.00% \$0 BOND 0.00% \$2,580 PROFIT 10.00%

\$30,955

A09 ELECTRICAL

Date: 14-Oct-94 Estimate: BLDG 6113 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 230.00 L.F. AND RECEPTACLES 4.57 0.00 0.00 6.79 2.22 Unit values 0.15 34.27 \$0 \$0 \$1,562 \$510 \$1,052 Totals 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 6.79 2.22 4.57 0.00 0.00 Unit values 0.15 \$0 \$0 17.88 \$549 \$815 Totals \$266

\$1,601

\$776

53

\$0

\$0

\$2,377

\_\_\_\_\_\_

Line #	Description		
		Labor Equipment	
=======================================	=======================================	=======================================	=======================================
1517010650	W/CPLGS	PIPE, SCHEDULE 40,	220.00 L.F.
Unit values Totals	0.44 4.17 97.68 \$917	10.30 0.00 \$2,267 \$0	0.00 14.47 \$0 \$3,184
1517011310	GAS SERVICE PIPE STI FOR CVRG 10'OC 1/2"	DTAM .	240 00 T E
Unit values Totals	0.13 1.64 43.18 \$558	2.88 0.00	0.00 4.52
1519010320	ALUMINUM REFLECTORS	W/HANGERS .	00.00 %
Unit values Totals		3.80 0.00 \$110 \$0	29.00 Ea. 0.00 43.59 \$0 \$1,264
1524105040	VACUUM PUMP AND VEN	r piping	
Unit values Totals	3.00 738.35 3.00 \$738	120.15 0.00 \$120 \$0	1.00 Ea. 0.00 858.50 \$0 \$858
1552301020	CRV-90 GAS FIRED BUI	RNER, 90 MBH & COMBU	
Unit values Totals	1.00 860.00 6.00 \$5,160	44.06 0.00 \$264 \$0	
1554510160	CO-RAY-VAC VANTAGE	2 INFA-RD HTG UNT, C	
Unit values Totals	6.00 1065.00 6.00 \$1,065		1.00 Ea. 0.00 1228.40 \$0 \$1,228
1554510220	CO-RAY-VAC VANTAGE 2	2 INFA-RD HTG UNIT, C	
Unit values Totals	4.00 935.00 16.00 \$3,740	81.70 0.00 \$327 \$0	4.00 Ea. 0.00 1016.70 \$0 \$4,067
1556800120	CO-RAY-VAC VANTAGE 2	VENT PIPE	5 00 B
Unit values Totals	1.60 70.00 8.00 \$350	76.50 0.00 \$382 \$0	5.00 Ea. 0.00 146.50 \$0 \$732
1574205220	ELECTRIC THERMOSTAT	W/ COVER AND WIRING	C 00 E-
Unit values Totals	1.00 75.00 6.00 \$450	27.55 0.00 \$165 \$0	6.00 Ea. 0.00 102.55 \$0 \$615

Line #	Descripti	.on			•	
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================		=======		<del></del>		
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100	HEATING S	SYSTEM POWE	R / CONT	ROL PANEL	1 00	E.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	1.00 0.00 \$0	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

	=======	=======	=======	=========	========	========
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	========	=======================================	± = = = = = = = = = = = = = = = = = = =	± = = = = = = = = = = = = = = = = = = =		=======
ESTIMATE TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0 \$0
TOR TOTAL						\$21,687

Estimate: BLDG 6113

FORT KNOX, KY

Date: 14-Oct-94

Description: INFRARED HEATING SYSTEM COST ESTIMATE Project: LIMITED EEAP(GLASSBID Date:

Job #:

94013.02

Location: Sq. footage:

City indx:Louisville, KY

=======================================	=======	=======:	=======	=======		========
·	S 	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	_=======	=======	=======	========		
•					<b>.</b>	
A09 ELECTRICAL	53	\$776	\$1,601 \$4,776	\$0 \$0	\$0 \$0	\$2,377 \$18,908
U15 MECHANICAL U16 ELECTRICAL	201 3	\$14,132 \$331	\$4,776	\$0 \$0 \$0	\$0 \$0 \$0	\$402
TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00% 0.00%	<b>\$</b> 0	\$0			
EQUIPT MARKUP	0.00%		40	\$0		
SUB MARKUP	0.00%				\$0	
	ONTINGENC	\$15,239	\$6,448	\$0	\$0	\$21,687
CONTINGENCY BOND	0.00% 0.00%				•	\$0 \$0 \$0
PROFIT	0.00%					\$0 \$0
JOB TOTAL				_		\$21,687

14-Oct-94 Date: BLDG 6114 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: FORT KNOX, KY Location: City indx:Louisville, KY 6900.00 Sq. footage: Description Line # \_\_\_\_\_ Equipment Matl Labor Manhours SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 320.00 L.F. 4 "DIAMETER 0.00 3.16 1.29 0.00 4.44 Unit values 0.15 \$1,421 Totals 48.00 \$0 \$1,010 \$411 \$0 0207180380 HVAC DEMO, BOILER GAS/OIL STL >150MBH 1.00 Ea. 0.00 323.82 12.00 0.00 323.82 0.00 Unit values \$0 \$0 \$324 12.00 \$0 \$324 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.75 Ton 14.55 0.00 380.36 0.00 0.00 380.36 Unit values 10.91 \$0 \$0 \$285 \$0 \$285 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 0.00 1.97 0.24 2.21 Unit values 0.07 0.00 \$336 \$40 \$0 \$376 \$0 Totals 12.07 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 50.00 Ea. DIAMETER PIPE 0.68 6.23 0.20 0.00 5.55 0.00 Unit values 10.00 Totals \$0 \$278 \$34 \$0 \$312 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER . 0266907800 1.00 Ea. 5.91 300.98 259.60 35.47 0.00 Unit values 1.56 Totals 1.56 \$260 \$35 \$6 \$0 \$301 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 0.17 5.06 Unit values 0.11 1.92 2.96 0.00 \$96 \$9 \$0 \$253 Totals 5.35 \$148 \$3,272 U02 SITEWORK \$2,416 \$500 \$0 100 \$356

=======================================	========	=======		========		=======
Line #	Description	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	<u> </u>				
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See At	tached for 1.00	Breakdown LS
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	21687.00	22610.40 \$22,610
1562600137	GAS APPLIANTYPE 1-1/4			BLE DIAPHR	AGM 1.00	Ea.
Unit values Totals	0.53 0.53	226.00 \$226	12.10 \$12	0.00 \$0	0.00	238.10 \$238
U15 MECHANICAL	9	\$986	\$175	\$0	\$21,687	\$22,848

JOB TOTAL

\$31,344

=======================================	========	======		=======	=======	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================			. <b></b>			
ESTIMATE TOTAL	109	\$1,342	\$2,591	\$500	\$21,687	\$26,120
SALES TAX MATL MARKUP LABOR MARKUP EOUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SUB MARKUP	0.00%			ŞO	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,342	\$2,591	\$500	\$21,687	\$26,120 \$2,612 \$0 \$2,612

Estimate:

14-Oct-94

Description:

Project:

BLDG 6114 Date:
COST ESTIMATE
LIMITED EEAP(GLASSBid Date:
FORT KNOX, KY Job #:

Location:

94013.02

Sq. footage:

6900.00

Job #: 94013.02 City indx:Louisville, KY

bq. roccago.		=	=======			========
=======================================	Si	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	======				
U02 SITEWORK U15 MECHANICAL	100 9	\$356 \$986	\$2,416 \$175	\$500 \$0	\$0 \$21,687	\$3,272 \$22,848
TOTAL	109	\$1,342	\$2,591	\$500	\$21,687	\$26,120
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		4~	\$0	\$0	
CONTINGENCY	ONTINGENC 10.00% 0.00%	\$1,342	\$2,591	\$500	\$21,687	\$26,120 \$2,612 \$0
BOND PROFIT	10.00%			•	•	\$2,612
JOB TOTAL			•			\$31,344

A09 ELECTRICAL

\_\_\_\_\_\_\_ 14-Oct-94 Date: BLDG 6114 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment \_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 230.00 L.F. 4.57 0.00 6.79 0.15 2.22 0.00 Unit values 34.27 \$0 \$0 \$1,562 \$510 \$1,052 Totals 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 0.00 2.22 4.57 0.00 6.79 Unit values. 0.15 17.88 \$549 \$0 \$0 \$815 Totals \$266

\$1,601

\$0

\$0

\$2,377

\$776

53

:===========		========			=======	
Line #	Descriptio	n				
	Manhours			Equipment		Total
			======			
1517010650	*			CHEDULE 40,	220.00	L.F.
Unit values Totals	W/CPLGS 0.44 97.68	4.17 \$917	10.30 \$2,267	0.00 \$0		
1517011310	GAS SERVIC	E PIPE STI			D W/CPLG 340.00	
Unit values Totals	0.13 43.18	1.64 \$558	2.88	0.00 \$0	0.00	
1519010320	ALUMINUM R	EFLECTORS	W/HANGE	RS	29.00	Po.
Unit values Totals	0.50 14.50	39.79 \$1,154			0.00	
1524105040	VACUUM PUM	P AND VEN	r PIPING		1 00	П-
Unit values Totals	3.00	738.35 \$738	120.15 \$120	0.00 \$0		858.50
1552301020	CRV-90 GAS	FIRED BUI	RNER, 90	MBH & COM	BUSTION C	
Unit values Totals	1.00	860.00 \$5,160	44.06 \$264	0.00 \$0	6.00 0.00 \$0	
1554510160	CO-RAY-VAC	VANTAGE 2	2 INFA-	RD HTG UNT,	GAS 100M	
Unit values Totals		1065.00 \$1,065		0.00 \$0	0.00	
1554510220	CO-RAY-VAC	VANTAGE 2	2 INFA-R	D HTG UNIT,		
Unit values Totals	4.00 16.00	935.00 \$3,740	81.70 \$327		4.00 0.00 \$0	1016.70
1556800120	CO-RAY-VAC	VANTAGE 2	VENT P	IPE	F 00	П-
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382		5.00 0.00 \$0	146.50 \$732
1574205220	ELECTRIC T	HERMOSTAT	W/ COVE	R AND WIRIN	G 6.00	Eo
Unit values Totals	1.00 6.00	75.00 \$450	27.55 \$165		0.00 \$0	102.55 \$615

Line #	Descript	ion	<b></b> -			
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======					
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100	HEATING	SYSTEM POWER	R / CONT	ROL PANEL	1.00	Ea.
Unit values Totals	2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00 \$0	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

 =============	=======	========		=========	========	
Line #	Descripti	on		· 		
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	=======	========	======	
ESTIMATE TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	**		
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	•
TOTAL BEFORE C CONTINGENCY BOND PROFIT	CONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	<b>\$</b> 0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

Estimate: BLDG 6114 Date: 14-Oct-94

Description: INFRARED HEATING SYSTEM COST ESTIMATE Project: LIMITED EEAP(GLASSBID Date: Project:

94013.02

Location:

FORT KNOX, KY

Job #:

Sq. footage:

City indx:Louisville, KY 

SUMMARY						
•	Manhours	Matl	Labor	Equipment	Sub	Total
==========	=======	========	=======	=======		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	201	\$776 \$14,132 \$331	\$1,601 \$4,776 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$18,908 \$402
TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP EOUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SUB MARKUP	0.00%				\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	<b>\$</b> 0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

\_\_\_\_\_\_ 14-Oct-94 BLDG 6115 Date: Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY 6900.00 Sq. footage: Description Labor Equipment Matl Manhours \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 320.00 L.F. 4"DIAMETER 0.00 3.16 1.29 0.00 Unit values 0.15 \$411 \$0 48.00 \$0 \$1,010 \$1,421 Totals 0207183600 HVAC DEMO, MECH EOPT HEAVY ITEM 0.75 Ton Unit values 0.00 380.36 0.00 0.00 380.36 14.55 10.91 \$0 \$285 \$0 \$0 \$285 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 0.24 1.97 0.00 2.21 Unit values 0.07 0.00 \$40 \$0 Totals 12.07 \$0 \$336 \$376 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 50.00 Ea. DIAMETER PIPE 0.68 0.00 5.55 0.00 6.23 Unit values 0.20 \$34 Totals 10.00 \$0 \$278 \$0 \$312 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. Unit values 1.56 259.60 35.47 5.91 0.00 300.98 1.56 Totals \$260 \$35 \$6 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values 0.11 1.92 2.96 0.17 0.00 5.06 5.35 Totals \$96 \$148 \$9 \$0 \$253 U02 SITEWORK 88 \$356 \$2,092 . \$500 \$0 \$2,948

	========	======	========	=======	=======	
Line #	Description	n				
	Manhours	Matl	Labor E	quipment	Sub .	Total
	=========	======				
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See Att	ached for	Breakdown)
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	21687.00	22610.40 \$22,610
1562600137	GAS APPLIA			LE DIAPHR		E.
Unit values Totals	TYPE 1-1/4 0.53 0.53		12.10 \$12	0.00 \$0	1.00 0.00 \$0	238.10 \$238
U15 MECHANICAL	9	\$986	\$175	\$0	\$21.687	\$22.848

/=========	========	=======						
Line #	Description	Description						
	Manhours	Matl	Labor	Equipment	Sub	Total		
	=======	=======						
ESTIMATE TOTAL	, 97	\$1,342	\$2,267	\$500	\$21,687	\$25,796		
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0			
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0 \$2,580		
JOB TOTAL .				•		\$30,955		

Date: 14-Oct-94

Estimate:

BLDG 6115

Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBID Date: Project:

Location:

FORT KNOX, KY Job #: 94013.02
6900.00 City indx:Louisville, KY

Sq.	footage:	6900.00		city indx	: LOUISVIIIE	, KI =======	========
===	========	======== SI	JMMARY				
		Manhours	Matl	Labor	Equipment	Sub	Total
===		========	======				
U02 U15		88 9	\$356 \$986	\$2,092 \$175	\$500 \$0	\$0 \$21,687	\$2,948 \$22,848
TOT	AL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796
MAT LAB EQU	ES TAX L MARKUP OR MARKUP IPT MARKUP MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
CON BON	TINGENCY	ONTINGENC 10.00% 0.00% 10.00%	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0 \$2,580
JOB	TOTAL						\$30,955

A09 ELECTRICAL

\_\_\_\_\_\_ Date: 14-Oct-94 BLDG 6115 Estimate: INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Description Line # Equipment Sub Matl Labor Manhours \_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 230.00 L.F. AND RECEPTACLES 0.00 6.79 Unit values 0.15 2.22 4.57 0.00 \$0 \$0 \$1,562 Totals 34.27 \$510 \$1,052 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 0.00 6.79 2.22 4.57 0.00 Unit values 0.15 \$549 \$0 \$0 \$815 Totals 17.88 \$266

\$1,601

\$0

\$0

\$2,377

\$776

53

=======================================	=======================================	:======================================	=======================================
Line #	Description		
	Manhours Matl	Labor Equipment	Sub Total
=======================================	=======================================		
1517010650	זוז / מסד מפ	PIPE, SCHEDULE 40,	220.00 L F
Unit values Totals	0.44 4.17 97.68 \$917	10.30 . 0.00 \$2,267 \$0	0.00 14.47 \$0 \$3,184
1517011310	GAS SERVICE PIPE ST FOR CVRG 10'OC 1/2"	TEEL GALV SCH 40 THRD	W/CPLG & HNGR SZD 340.00 L.F.
Unit values Totals	0.13 1.64 43.18 \$558	DIAM 2.88 0.00 \$978 \$0	0.00 4.52 \$0 \$1,536
1519010320	ALUMINUM REFLECTORS	W/HANGERS	29.00 Ea.
Unit values Totals	0.50 39.79 14.50 \$1,154	3.80 0.00 \$110 \$0	0.00 43.59 \$0 \$1,264
1524105040	VACUUM PUMP AND VEN	T PIPING	1.00 Ea.
Unit values Totals	3.00 738.35 3.00 \$738	120.15 0.00 \$120 \$0	0.00 Ea. 0.00 858.50 \$0 \$858
1552301020	CRV-90 GAS FIRED BU	JRNER, 90 MBH & COMB	USTION CHAMBER 6.00 Ea.
Unit values Totals	1.00 860.00 6.00 \$5,160	44.06 0.00 \$264 \$0	0.00 Ea. 0.00 904.06 \$0 \$5,424
1554510160	CO-RAY-VAC VANTAGE	2 INFA-RD HTG UNT,	GAS 100MBH 1.00 Ea.
Unit values Totals .	6.00 1065.00 6.00 \$1,065	163.40 · 0.00 \$163           \$0	0.00 1228.40
1554510220	CO-RAY-VAC VANTAGE	2 INFA-RD HTG UNIT,	GAS 40 MBH 4.00 Ea.
Unit values Totals	4.00 935.00 16.00 \$3,740	81.70 0.00 \$327 \$0	0.00 1016.70 \$0 \$4,067
1556800120	CO-RAY-VAC VANTAGE	2 VENT PIPE	5.00 Ea.
Unit values Totals	1.60 70.00 8.00 \$350	76.50 0.00 \$382 \$0	0.00 146.50 \$0 \$732
1574205220	ELECTRIC THERMOSTAT	W/ COVER AND WIRING	6.00 Ea.
Unit values Totals	1.00 75.00 6.00 \$450	27.55 0.00 \$165 \$0	0.00 Ea. 0.00 102.55 \$0 \$615

Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	55555555				
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100	HEATING S	YSTEM POWE	R / CONT	ROL PANEL	1.00	Ea.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
******						
ESTIMATE TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

Estimate: BLDG 6115 Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

Project: Location:

JOB TOTAL

FORT KNOX, KY

Job #: 94013.02 City indx:Louisville, KY

Sq. footage:		·	City indx	:Louisville,	, KY 	
:	======= S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	======					
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	53 201 3	\$776 \$14,132 \$331	\$1,601 \$4,776 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$18,908 \$402
TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0 <sup>.</sup>			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	· \$0	\$0	\$21,687 \$0 \$0 \$0 \$0

\$21,687

14-Oct-94 Date: BLDG 6116 COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: FORT KNOX, KY Location: City indx:Louisville, KY 6900.00 Sq. footage: Description \_\_\_\_\_ Equipment Labor Matl Manhours SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 -320.00 L.F. 4 "DIAMETER 1.29 4.44 3.16 0.00 0.00 0.15 Unit values \$0 \$1,421 \$0 \$1,010 \$411 48.00 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.75 Ton 0.00 0.00 380.36 0.00 380.36 14.55 Unit values \$0 \$0 \$285 \$0 \$285 Totals 10.91 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 0.24 0.00 2.21 1.97 0.07 0.00 Unit values \$336 \$40 \$0 \$376 \$0 12.07 Totals REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 50.00 Ea. DIAMETER PIPE 6.23 5.55 0.68 0.00 0.00 Unit values 0.20 \$0 \$312 . \$0 \$278 \$34 Totals 10.00 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 300.98 5.91 Unit values 1.56 259.60 35.47 0.00 \$301 \$260 \$6 \$0 Totals 1.56 \$35 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 • END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 0.17 0.00 5.06 1.92 2.96 0.11 Unit values \$96 \$148 \$9 \$0 \$253 5.35 Totals \$500 \$0 \$2,948 U02 SITEWORK 88 \$356 \$2,092

	========	=======	=======	=======	========	
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	: Sub	Total
	========					
1554510245	HTG INFA-R	D UNT GAS	ELEC IG	(See	Attached for 1.00	or Breakdow LS
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	21687.00 \$21,687	
1562600137	GAS APPLIA TYPE 1-1/4	NCE REGUL		JBLE DIAPH	IRAGM 1.00	Ea.
Unit values Totals	0.53 0.53	226.00 \$226	12.10 \$12	0.00 \$0	0.00	238.10 \$238
U15 MECHANICAL	9	\$986	\$175	\$0	\$21,687	\$22,848

	=========		=======	========	=======================================	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	======				
ESTIMATE TOTAL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	. \$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0 \$2,580
JOB TOTAL						\$30,955

Estimate: BLDG 6116 Date: 14-Oct-94 Description: COST ESTIMATE

Sq. footage: 6900.00

Project: LIMITED EEAP (GLASSBID Date:
Location: FORT KNOX, KY Job #: 94013.02
Sq. footage: 6900.00 City indx:Louisville, KY

	S	JMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	========	=======	=======		
U02 SITEWORK U15 MECHANICAL	88 9	\$356 \$986	\$2,092 \$175	\$500 \$0	\$0 \$21,687	\$2,948 \$22,848
TOTAL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	٠		
EQUIPT MARKUP SUB MARKUP	0.00%			\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND	ONTINGENC 10.00% 0.00%	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0
PROFIT	10.00%			. •		\$2,580
JOB TOTAL						\$30,955

		:=======		=======================================		=========
Estimate: Description: Project: Location: Sq. footage:	BLDG 6116 INFRARED H LIMITED EF FORT KNOX,	HEATING SY EAP (GLASSB KY J	ate: 1 STEM COST id Date: ob #: ity indx:L	4-Oct-94 ESTIMATE 94013.02 ouisville,	KY =======	. = = = = = = = = =
Line #	Description	on				
			Labor E	quipment	Sub .	Total
=======================================	=======================================	:======		=======================================	======	:=======
				L CONDUIT,		L.F.
Unit values Totals	0.15 34.27	2.22 \$510	4.57 \$1,052	0.00	0.00 \$0	6.79 \$1,562
0913100200	CO-RAY-VAC	C VANTAGE	2 POWER FE	EDER INSTAI	LLATION,	L.F.
Unit values Totals	0.15	2.22	4.57	0.00 \$0	0.00	6.79 \$815
A09 ELECTRICAL	53	\$776	\$1,601	\$0	\$0	\$2,377

	========		======	======	=====	======	========
Line #	Description	on					
	Manhours					Sub	Total
	=========	=====					
1517010650	BLACK STEI	EL RADIANT	PIPE,	SCHEDUL	E 40,	THREADED	, 4" DIAM
Unit values Totals	0.44 97.68	4.17 \$917	10.3 \$2,26	0 7	0.00 \$0	0 00	
1517011310		CE PIPE STI 10'OC 1/2"	EEL GAL	V SCH 4	O THRI	W/CPLG 340.00	& HNGR SZD L.F.
Unit values Totals	0.13 43.18	1.64	2.8 \$97	8	0.00 \$0	0.00	
1519010320	ALUMINUM I	REFLECTORS	W/HANG	ERS		29.00	Ea.
Unit values Totals	0.50 14.50		3.8 \$11		0.00 \$0	0.00	43.59 \$1,264
1524105040	VACUUM PUI	MP AND VEN	r pipin	ıG <sub>.</sub>		1 00	Ea.
Unit values Totals	3.00	738.35 \$738			0.00 \$0	0.00	
1552301020	CRV-90 GAS	S FIRED BU	RNER, 9	0 MBH	& COME	BUSTION C	HAMBER Ea.
Unit values Totals	1.00	860.00 \$5,160	44.0 \$26		0.00 \$0	0.00	
1554510160	CO-RAY-VA	C VANTAGE	2 INFA	-RD HTG	UNT,	GAS 100M 1.00	BH Ea.
Unit values Totals	6.00 6.00	1065.00 \$1,065	163.4 \$16		0.00 \$0	0.00	
1554510220	CO-RAY-VA	C VANTAGE	2 INFA-	RD HTG	UNIT,	GAS 40 M 4.00	
Unit values Totals	4.00 16.00	935.00 \$3,740	81.7 \$32	-	0.00 \$0		1016.70
1556800120	CO-RAY-VA	C VANTAGE	2 VENT	PIPE		5.00	Ea
Unit values Totals	1.60 8.00	70.00 \$350	76.5 \$38		0.00 \$0	0.00	146.50
1574205220	ELECTRIC :	THERMOSTAT	W/ COV	ER AND	WIRING	6.00	Ea.
Unit values Totals	1.00 6.00	75.00 \$450	27.5 \$16		0.00 \$0	0.00 \$0	102.55

/======================================						
Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
============	======	========	=======			
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100	HEATING	SYSTEM POWE	R / CONTE	ROL PANEL	1.00	Ea.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
II16 ELECTRICAL	. 3	\$331	\$71	\$0	\$0	\$402

=========	========	========			.=======	
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======		=======================================		=======
ESTIMATE TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

Estimate: BLDG 6116

Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE

Description: Project:

LIMITED EEAP (GLASSBID Date: FORT KNOX, KY Job #:

Location:

94013.02

Sq. footage:

Job #: 94013.02 City indx:Louisville, KY

=======================================	======= S	====== UMMARY	=======			
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======	=======		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	53 201 3	\$776 \$14,132 \$331	\$1,601 \$4,776 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$18,908 \$402
TOTAL	257	\$15,239	\$6,448	. \$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		·	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

Date: 14-Oct-94 BLDG 6117 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: 6900.00 Description ' Equipment Sub Matl Labor Manhours ------SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 320.00 L.F. 4"DIAMETER 0.00 3.16 1.29 0.00 0.15 Unit values \$0 \$1,421 \$411 \$0 \$1,010 48.00 Totals HVAC DEMO, BOILER GAS/OIL STL >150MBH 0207180380 1.00 Ea. 323.82 0.00 0.00 323.82 0.00 Unit values 12.00 \$0 \$0 \$324 \$324 \$0 12.00 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.75 Ton 0.00 0.00 380.36 380.36 0.00 Unit values 14.55 \$0 \$285 \$0 \$285 \$0 10.91 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 2.21 0.24 0.00 0.00 1.97 0.07 Unit values \$0 \$376 \$336 \$40 \$0 Totals 12.07 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 50.00 Ea. DIAMETER PIPE 0.68 6.23 0.00 0.00 5.55 0.20 Unit values \$312 \$0 \$278 \$34 10.00 \$0 Totals CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 300.98 5.91 0.00 259.60 35.47 Unit values 1.56 \$0 \$301 \$6 \$35 \$260 Totals 1.56 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 0.00 5.06 2.96 0.17 1.92 0.11 Unit values \$0 \$253 \$9 \$96 \$148 5.35 Totals \$3,272 \$500 \$0 \$356 \$2,416 U02 SITEWORK 100

_======================================	========	=======	======	========	:=======	=======
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	======	=====			
1554510245	HTG INFA-R	D UNT GAS	ELEC IG	N (See At	tached for	r Breakdown LS
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	21687.00 \$21,687	22610.40 \$22,610
1562600137	GAS APPLIA	NCE REGUL	ATORS DO	UBLE DIAPHE	RAGM 1.00	Ea.
Unit values Totals		226.00 \$226	12.10	0.00 \$0	0.00	238.10 \$238
U15 MECHANICAL	9	\$986	\$175	. \$0	\$21,687	\$22,848

	========	=======	=======	========	========	=======		
Line #	Description							
	Manhours	Matl	Labor	Equipment	Sub	Total		
=======================================	========	=======	=======		=======	========		
ESTIMATE TOTAL	109	\$1,342	\$2,591	\$500	\$21,687	\$26,120		
SALES TAX	0.00% 0.00%	\$0 \$0						
MATL MARKUP LABOR MARKUP	0.00%	ŞU	\$0	ĊO				
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0			
TOTAL BEFORE C	ONTINGENC 10.00%	\$1,342	\$2,591	\$500	\$21,687	\$26,120 \$2,612		
BOND	0.00%					\$0 \$2,612		
PROFIT	10.00%					• •		
JOR TOTAL						\$31,344		

Estimate:

Date: 14-Oct-94

Description:

BLDG 6117 COST ESTIMATE

Project: Location:

LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY 6900.00

Job #: 94013.02 City indx:Louisville, KY

Sq.	footage:	6900.00	(	city inax	: DOUISVIIIE	, Kı ========	
===	######################################	SI	JMMARY				
		Manhours	Matl	Labor	Equipment	Sub	Total
===	========	========	=======	=======			
U02 U15		100	\$356 \$986	\$2,416 \$175	\$500 \$0	\$0 \$21,687	\$3,272 \$22,848
TOT	AL	109	\$1,342	\$2,591	\$500	\$21,687	\$26,120
MAT LAB	ES TAX L MARKUP OR MARKUP IPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SÜB	MARKUP	0.00%				\$0	
	TINGENCY	ONTINGENC 10.00% 0.00%	\$1,342	\$2,591	\$500	\$21,687	\$26,120 \$2,612 \$0
	FIT	10.00%					\$2,612
JOB	TOTAL						\$31,344

BLDG 6117 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description Labor Equipment Manhours Matl \_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 230.00 L.F. AND RECEPTACLES 4.57 0.00 0.00 6.79 2.22 Unit values 0.15 \$510 \$1,052 \$0 \$0 \$1,562 Totals 34.27 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES
0.15 2.22 4.57 0.00 120.00 L.F. 6.79 0.00 Unit values \$0 \$0 \$815 \$266 \$549 Totals 17.88 \$0 \$0 \$2,377 A09 ELECTRICAL 53 \$776 \$1,601

	=======================================	========			
Line #	Description				
	Manhours Mat				
=======================================	=======================================				
1517010650	w/cpi.gs			220.00	, 4" DIAM L.F.
Unit values Totals	0.44 4	.17 10.3 917 \$2,26	0 0.00 7 \$0	0.00	14.47 \$3,184
1517011310	GAS SERVICE PI FOR CVRG 10'OC	PE STEEL GAL	V SCH 40 THR	D W/CPLG 8	MINGR SZD L.F.
Unit values Totals	FOR CVRG 10'OC 0.13 1 43.18 \$	.64 2.8 558 \$97	8 0.00 8 \$0	0.00	4.52 \$1,536
1519010320	ALUMINUM REFLE	CTORS W/HANG	ERS	29.00	₽a
Unit values Totals .	0.50 39 14.50 \$1,	.79 3.8 154 \$11	0 .00	0.00	43.59 \$1,264
	VACUUM PUMP AN			1.00	E.
Unit values Totals	3.00 738 3.00 \$	.35 120.1 738 \$12	5 0.00 0 \$0	0.00	858.50 \$858
1552301020	CRV-90 GAS FIR	ED BURNER, 9	0 MBH & COM	BUSTION CE 6.00	HAMBER
Unit values Totals	1.00 860 6.00 \$5,	.00 44.0 160 \$26	6 0.00	0.00	904.06
1554510160	CO-RAY-VAC VAN	TAGE 2 INFA	-RD HTG UNT,	GAS 100MF	
Unit values Totals	6.00 1065 6.00 \$1,	.00 163.4 065 \$16	0 0.00 3 \$0	0.00	1228.40 \$1,228
1554510220	CO-RAY-VAC VAN	TAGE 2 INFA-	RD HTG UNIT,		
Unit values Totals	4.00 935 16.00 \$3,	.00 81.7 740 \$32	0 0.00 7 \$0	0.00 \$0	Ea. 1016.70 \$4,067
1556800120	CO-RAY-VAC VAN	TAGE 2 VENT	PIPE	F 00	To.
Unit values Totals	1.60 70 8.00 \$				146.50
1574205220	ELECTRIC THERM	OSTAT W/ COV	ER AND WIRING	6.00	Fa
Unit values Totals		.00 27.5 450 \$16			102.55 \$615

/=================================		=========	 
	=======================================	=========	 

Line #	Descript	ion				
	Manhours	Matl	Labor Ec	quipment	Sub	Total
	======					
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100 .	HEATING	SYSTEM POWE	R / CONTROI	PANEL	1.00	Fa.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

=======================================	========	=======			=========	
Line #	Descripti	on.				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======================================		= = = = = <del></del>			
ESTIMATE TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		·
SÜB MARKUP	0.00%				\$0 -	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	CONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL .				•		\$21,687

Estimate: Description:

BLDG 6117 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP (GLASSBID Date:

Project:

Location:

94013.02 FORT KNOX, KY Job #:

Sq. footage:

City indx:Louisville, KY

=======================================	======= S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
	========					
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	201	\$776 \$14,132 \$331	\$1,601 \$4,776 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$18,908 \$402
TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0 \$0
JOB TOTAL						\$21,687

\_\_\_\_\_ BLDG 6118 Date: 14-Oct-94 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: 6900.00 Description Matl Labor Equipment Sub Manhours \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 320.00 L.F. 4"DIAMETER 0.15 0.00 Unit values 3.16 1.29 0.00 Totals 48.00 \$0 \$1,010 \$411 \$0 \$1,421 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 0.75 Ton 0.00 14.55 0.00 380.36 0.00 380.36 Unit values \$0 Totals 10.91 \$0 \$285 \$0 \$285 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 0.07 0.24 0.00 1.97 0.00 2.21 Unit values \$40 Totals 12.07 \$0 \$336 \$0 \$376 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 DIAMETER PIPE 50.00 Ea. Unit values 0.20 0.00 5.55 0.68 0.00 6.23 Totals 10.00 \$0 \$278 \$34 \$0 \$312 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. Unit values 259.60 5.91 0.00 300.98 1.56 35.47 Totals 1.56 \$260 \$35 \$6 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 50.00 L.F. END, TAR COAT&WRAP 1"DIAM Unit values 2.96 0.17 5.06 0.11 1.92 0.00 Totals 5.35 \$96 \$148 \$9 \$0 \$253 U02 SITEWORK 88 \$356 \$2,092 \$500 \$0 \$2,948

_=========		=======	======	========	========	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======				
1554510245	HTG INFA-R	D UNT GAS	ELEC IG	N (See At	tached for	r Breakdown
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	· 0.00 \$0	21687.00	
1562600137	GAS APPLIA			UBLE DIAPHR	AGM 1.00	₽a
Unit values Totals		226.00 \$226		0.00 \$0		238.10 \$238
II15 MECHANICAL	g	\$986	\$175	\$0	\$21,687	\$22.848

	========			========		=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	: = = = = = = = = = = = = = = = = = = =	=======	======		=======	***=====
					•	
ESTIMATE TOTAL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND	ONTINGENC 10.00% 0.00%	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0
PROFIT	10.00%					\$2,580
JOB TOTAL						\$30,955

\_\_\_\_\_\_\_

Estimate: BLDG 6118
Description: COST ESTIMATE

Date: 14-Oct-94

Project: Location:

LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY Job #: 6900.00 City in

Sq. footage:

City indx:Louisville, KY

	St	JMMARY				<u> </u>
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	=======		========	======
U02 SITEWORK U15 MECHANICAL	88 9	\$356 \$986	\$2,092 \$175	\$500 \$0	\$0 \$21,687	\$2,948 \$22,848
TOTAL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SUB MARKUP	0.00%			·	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0 \$2,580
JOB TOTAL				·		\$30,955

Estimate: BLDG 6118 Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP (GLASSBid Date: Project: Job #: FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_\_ Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 230.00 L.F. 4.57 0.00 0.15 2.22 Unit values 0.00 Totals 34.27 \$510 \$1,052 \$0 \$0 \$1,562 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION; INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. Unit values 2.22 4.57 0.00 6.79 0.15 0.00 Totals 17.88 \$266 \$549 \$0 \$0 \$815 A09 ELECTRICAL \$1,601 \$0 53 \$776 \$0 \$2,377

		=======================================	
Line #	Description		
		Labor Equipment	Sub Total
	=======================================		
1517010650	BLACK STEEL RADIANT W/CPLGS		220.00 L.F.
Unit values Totals	0.44 4.17 97.68 \$917	10.30 0.00 \$2,267 \$0	0.00 14.47 \$0 \$3,184
1517011310	GAS SERVICE PIPE STE FOR CVRG 10'OC 1/2"	EL GALV SCH 40 THRE	W/CPLG & HNGR SZD 340.00 L.F.
Unit values Totals	0.13 1.64 43.18 \$558	2.88 0.00 \$978 \$0	0.00 4.52 \$0 \$1,536
1519010320	ALUMINUM REFLECTORS	W/HANGERS	20 00 8-
Unit values Totals	0.50 39.79 14.50 \$1,154	3.80 0.00 \$110 \$0	29.00 Ea. 0.00 43.59 \$0 \$1,264
1524105040	VACUUM PUMP AND VENT	PIPING	1 00 77-
Unit values Totals	3.00 738.35 3.00 \$738	120.15 0.00 \$120 \$0	1.00 Ea. 0.00 858.50 \$0 \$858
1552301020	CRV-90 GAS FIRED BUR	NER, 90 MBH & COME	USTION CHAMBER
Unit values Totals	1.00 860.00 6.00 \$5,160	44.06 0.00 \$264 \$0	6.00 Ea. 0.00 904.06 \$0 \$5,424
1554510160	CO-RAY-VAC VANTAGE 2	INFA-RD HTG UNT,	
Unit values Totals	6.00 1065.00 6.00 \$1,065	163.40 0.00 \$163 \$0	1.00 Ea. 0.00 1228.40 \$0 \$1,228
1554510220	CO-RAY-VAC VANTAGE 2	INFA-RD HTG UNIT,	
Unit values Totals	4.00 935.00 16.00 \$3,740	81.70 0.00 \$327 \$0	4.00 Ea. 0.00 1016.70 \$0 \$4,067
1556800120	CO-RAY-VAC VANTAGE 2	VENT PIPE	
Unit values Totals	1.60 70.00 8.00 \$350	76.50 0.00 \$382 \$0	5.00 Ea. 0.00 146.50 \$0 \$732
1574205220	ELECTRIC THERMOSTAT	W/ COVER AND WIRING	
Unit values Totals	1.00 75.00 6.00 \$450	27.55 0.00 \$165 \$0	6.00 Ea. 0.00 102.55 \$0 \$615

<i></i>				•		
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100	HEATING S	YSTEM POWE	R / CONT	ROL PANEL		
1031200100			•		1.00	Ea.
Unit values	2.96	330.76	70.58	0.00	0.00	401.34
Totals	2.96	\$331	\$71	\$0	\$0	\$402
ria C DI DOMO TONI	3	\$331	\$71	\$0	\$0	\$402
U16 ELECTRICAL	3	ŞΣSI	Ş/I	ŞU	ŞU	\$4UZ

	=======	=======			=======	
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========	======	=======	======	= = = = = = = = =
ESTIMATE TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

Estimate: BLDG 6118

Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE

Project:

LIMITED EEAP (GLASSBid Date:

Location:

FORT KNOX, KY Job #: 94013.02

Sq. footage:

City indx:Louisville, KY

Sq. rootage:					, 	
==========	======== S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======	=======		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	201	\$776 \$14,132 \$331	\$1,601 \$4,776 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$18,908 \$402
TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		, ,	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL	·					\$21,687

06-Aug-94 Date: 614X AREA COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: SUBMAIN GAS LINE City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_\_ Labor Equipment Matl Manhours \_\_\_\_\_\_\_ TAMPING TRENCH B'FILL, VIBRATING PLATE, ADD 0222541900 86.00 C.Y. 0.00 1.74 0.67 0.00 2.41 0.09 Unit values 7.65 \$0 \$149 \$57 \$0 \$206 Totals TRENCH EXCVTNG 40HP CHNTRNCHR&BKFL 12"W24"D 0222582800 1160.00 L.F. 0.24 0.00 0.24 0.00 0.47 Unit values 0.01 \$274 \$0 \$0 \$274 \$548 Totals 11.60 HORZ BORNG , .5"WALL, 3"DIA CASING, ROCKY SOIL 0222700100 300.00 L.F. 0.62 0.10 10000.00 15.58 10016.30 Unit values 0.03 \$31 \$10,000 \$14,889 8.70 \$4,673 \$185 Totals BEDDING, FOR PIPE IN TRENCH SAND, DEAD OR 0260120200 21.50 C.Y. BANK 7.17 0.16 2.43 3.37 1.37 0.00 Unit values \$52 \$72 \$29 \$0 \$153 3.44 Totals 0260120500 BEDDING, PLACING IN TRENCH 21.50 C.Y. 0.00 2.41 0.09 1.74 0.67 Unit values 0.00 \$0 \$0 \$37 \$14 \$51 Totals 1.91 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 259.60 300.98 Unit values 35.47 5.91 0.00 1.56 \$6 \$0 \$301 Totals 1.56 \$260 \$35 GAS SERVICE & DISTRIB PIPING, POLYETHYLENE, 60-0268520200 PSI 2" DIAM COIL SDR 11 1460.00 L.F. 0.07 0.75 0.00 0.00 2.23 Unit values 1.48 Totals 97.82 \$1,099 \$2,161 \$0 \$0 \$3,260 \$2,913 \$411 \$10,000 \$19,408 U02 SITEWORK 133 \$6,084

_======================================	=======	========	=======		======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========	=======			
1562600139		ANCE REGUI IPE SIZE	LATORS DO	UBLE DIAPHRA	.GM 1.00	Ea.
Unit values Totals	0.73 0.73	420.00 \$420	16.42 \$16	0.00 \$0	0.00 \$0	436.42 \$436
U15 MECHANICAL	1	\$420	\$16	\$0	\$0	\$436

	========		=======		=======	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================		=======	======			
ESTIMATE TOTAL	134	\$6,504	\$2,929	\$411	\$10,000	\$19,844
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	<b>\$</b> 0	<b>\$</b> 0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$6,504	\$2,929	\$411	\$10,000	\$19,844 \$1,984 \$0 \$1,984
JOB TOTAL						\$23,813

\_\_\_\_\_\_\_ Estimate: 614X AREA Date: 06-Aug-94
Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:

Project: LIMITED EEAP(GLASSBID Date:
Location: FORT KNOX, KY Job #: 94013.02
Sq. footage: SUBMAIN GAS LINE City indx:Louisville, KY

SUMMARY						
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	:======:	=======			=====:	
U02 SITEWORK U15 MECHANICAL	133 1	\$6,084 \$420	\$2,913 \$16	\$ <b>411</b> \$0	\$10,000 \$0	\$19,408 \$436
TOTAL	134	\$6,504	\$2,929	\$411	\$10,000	\$19,844
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		4.0	\$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND	NTINGENC 10.00% 0.00%	\$6,504	\$2,929	\$411	\$10,000	\$19,844 \$1,984 \$0
PROFIT	10.00%					\$1,984
JOB TOTAL .						\$23,813

\_\_\_\_\_\_ BLDG 6142 Date: 14-Oct-94 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: City indx:Louisville, KY Sq. footage: 8100.00 Description Equipment Matl Labor Manhours \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 400.00 L.F. 4"DIAMETER 1.29 0.00 Unit values 0.15 0.00 3.16 4.44 \$0 \$514 \$0 \$1,776 Totals 60.00 \$1,262 HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.75 Ton 380.36 0.00 380.36 Unit values 14.55 0.00 0.00 10.91 \$0 \$285 \$0 \$0 \$285 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. 1.97 0.24 0.00 Unit values 0.07 0.00 2.21 \$47 \$395 \$0 \$442 Totals 14.20 \$0 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 DIAMETER PIPE 70.00 Ea. 0.68 0.00 5.55 0.00 6.23 Unit values 0.20 \$0 \$389 \$47 \$0 Totals 14.00 \$436 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. Unit values 259.60 35.47 5.91 0.00 300.98 1.56 Totals \$6 1.56 \$260 \$35 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values 0.11 1.92 2.96 0.17 0.00 5.06 Totals 5.35 \$96 \$148 \$9 \$0 \$253 U02 SITEWORK 107 \$356 \$2,514 \$623 \$0 \$3,493

	========	=======	=======	========		
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=========	======				
1554510245	HTG INFA-R	D UNT GAS	ELEC IG	N (See Att	tached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	25219.00	25219.00
1562600137	GAS APPLIA			JBLE DIAPHI		D-
Unit values Totals	TYPE 1-1/4 0.53 0.53		12.10 \$12	0.00 \$0	1.00 0.00 \$0	
U15 MECHANICAL	1	\$226	\$12	\$0	\$25,219	\$25,457

	========	========	=======		=======	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	108	\$582	\$2,526	\$623	\$25,219	\$28,950
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	;o	
TOTAL BEFORE C CONTINGENCY · BOND PROFIT	CONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,526	\$623	\$25,219	\$28,950 \$2,895 \$0 \$2,895
JOB TOTAL						\$34,740

\_\_\_\_\_ Estimate: BLDG 6142 Date: 14-Oct-94
Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02
Sq. footage: 8100.00 City indx:Louisville, KY

SUMMARY						
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=========	======		======		
U02 SITEWORK U15 MECHANICAL	107	\$356 \$226	\$2,514 \$12	\$623 \$0	\$0 \$25,219	\$3,493 \$25,457
TOTAL	108	\$582	\$2,526	\$623	\$25,219	\$28,950
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		ųσ	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,526	\$623	\$25,219	\$28,950 \$2,895 \$0 \$2,895
JOB TOTAL						\$34,740

\_\_\_\_\_\_\_\_ Estimate: BLDG 6142 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: Project: LIMITED EEAP(GLASSBid Date: FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_\_ Manhours Matl Labor Equipment Sub 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 340.00 L.F. AND RECEPTACLES 4.57 0.00 6.79 2.22 0.00 Unit values 0.15 \$0 \$1,555 \$0 \$2,308 Totals 50.66 \$753 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES
0.15 2.22 4.57 0.00 120.00 L.F. 6.79 Unit values 0.00 17.88 \$549 \$0 \$0 Totals \$266 \$815 \$0 A09 ELECTRICAL 69 \$1,019 \$2,104 \$0 \$3,123

===========	========	=======	======	========	=======	========
Line #	Description	on				
=======================================	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
1517010650				CHEDULE 40,		, 4" DIAM L.F.
Unit values Totals	0.44	4.17 \$1,376	10.30 \$3,400	0.00 \$0	0.00	14.47
1517011310						
Unit values Totals	0.13 57.15	1.64 \$738	2.88 \$1,294	0.00	0.00 \$0	4.52 \$2,032
1519010320	ALUMINUM F	REFLECTORS	W/HANGE	RS	45.00	F-2
Unit values Totals		39.79 \$1,791		0.00 \$0	0.00	43.59 \$1,962
1524105040	VACUUM PUN	IP AND VEN	T PIPING		1.00	Po
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00 \$0	0.00	858.50 \$858
1552301020					6 00	
Unit values. Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00 0.00 \$0	904.06
1554510160	CO-RAY-VAC	C VANTAGE	2 INFA-	RD HTG UNT,		BH Ea.
Unit values Totals	6.00 6.00		163.40 \$163	0.00 \$0	0.00	1228.40
1554510220	CO-RAY-VAC	. VANTAGE	2 INFA-R	D HTG UNIT,	GAS 40 M	
Unit values Totals	4.00 16.00	935.00 \$3,740	81.70 \$327			1016.70 \$4,067
1556800120	CO-RAY-VAC	VANTAGE	2 VENT P	IPE	5.00	Fo.
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382		0.00	146.50 \$732
1574205220	ELECTRIC I	HERMOSTAT	W/ COVE	R AND WIRIN	G 6.00	Fa
Unit values Totals	1.00 6.00	75.00 \$450	27.55 \$165		0.00 \$0	102.55 \$615

Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
_======================================	=======					
U15 MECHANICAL	272	\$15,408	\$6,286	\$0	\$0	\$21,694
1631200100	HEATING	SYSTEM POWER	R / CONTR	ROL PANEL	1.00	Fa
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

	========	=======		=========		
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======		===#====		
ESTIMATE TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		7.	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0 \$0
JOB TOTAL						\$25,219

Estimate: Description:

BLDG 6142 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE

Project:

LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY

Job #: 94013.02

Location: Sq footage:

City indx:Louisville, KY

Sq. rootage:						
=======================================	======= S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	_=======	=======			
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	69 272 3	\$1,019 \$15,408 \$331	\$2,104 \$6,286 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$3,123 \$21,694 \$402
TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX . MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	•		
EQUIPT MARKUP SUB MARKUP	0.00%		,	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	<b>\$</b> 0	\$0	\$25,219 \$0 \$0 \$0 \$0
JOB TOTAL	•					\$25,219

U02 SITEWORK

119

\_\_\_\_\_\_\_ BLDG 6143 Date: 14-Oct-94 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY 8100.00 Sq. footage: Description Line # Equipment Labor Manhours Matl \_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 400.00 L.F. 4"DIAMETER 0.00 1.29 3.16 0.00 Unit values 0.15 \$0 60.00 \$0 \$1,262 \$514 \$1,776 Totals HVAC DEMO, BOILER GAS/OIL STL >150MBH 0207180380 1.00 Ea. 0.00 Unit values 323.82 323.82 12.00 0.00 0.00 \$0 \$0 12.00 \$0 \$324 \$324 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.75 Ton 380.36 0.00 0.00 380.36 Unit values 14.55 0.00 \$0 \$0 \$285 \$285 Totals 10.91 \$0 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. 0.07 1.97 0.24 2.21 0.00 0.00 Unit values \$0 \$395 \$47 \$0 \$442 Totals 14.20 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 70.00 Ea. DIAMETER PIPE 0.20 0.00 5.55 0.68 0.00 6.23 Unit values \$389 \$47 \$0 \$436 \$0 Totals 14.00 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 300.98 Unit values 1.56 259.60 35.47 5.91 0.00 Totals 1.56 \$260 \$35 \$6 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 0.00 5.06 Unit values 0.11 1.92 2.96 0.17 5.35 \$96 \$148 \$9 \$0 \$253 Totals

\$2,838

\$623

\$356

\$3,817

\$0

<b>,</b> ====================================	========	=======	=======	========	=======	
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======		======			
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See Att	ached for	Breakdown) LS
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		25219.00 \$25,219
1562600137	GAS APPLIA TYPE 1-1/4			BLE DIAPHR	RAGM 1.00	Ea
Unit values Totals	0.53 0.53	226.00 \$226	12.10	0.00 \$0	0.00	238.10 \$238
U15 MECHANICAL	1	\$226	\$12	. \$0	\$25,219	\$25,457

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
•	========	= = = = = = = = = = = = = = = = = = = =		•		
ESTIMATE TOTAL	120	\$582	\$2,850	\$623	\$25,219	\$29,274
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%		·	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,850	\$623	\$25,219	\$29,274 \$2,927 \$0 \$2,927
JOB TOTAL						\$35,129

\_\_\_\_\_\_\_ Estimate: BLDG 6143 Date: 14-Oct-94

Description: Project:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

94013.02

Location: Sq. footage:

JOB TOTAL

FORT KNOX, KY Job #: 8100.00

City indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub Total \$356 U02 SITEWORK 119 \$2,838 \$623 \$0 \$3,817 U15 MECHANICAL \$25,219 \$226 \$12 \$0 \$25,457 1 TOTAL 120 \$582 \$2,850 \$623 \$25,219 \$29,274 SALES TAX \$0 0.00% MATL MARKUP \$0 0.00% \$0 LABOR MARKUP 0.00% \$0 EQUIPT MARKUP 0.00% SUB MARKUP \$0 0.00% TOTAL BEFORE CONTINGENC \$2,850 \$623 \$25,219 \$29,274 \$582 CONTINGENCY 10.00% \$2,927 BOND 0.00% \$0 \$2,927 PROFIT 10.00%

\$35,129

Estimate: BLDG 6143 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02

City indx:Louisville, KY Sq. footage:

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	======:		======			
0913100200	115V, 20 A		WIRING I	NCL CONDUIT,	WIRE, 340.00	L.F.
Unit values Totals	0.15 50.66	2.22 \$753	4.57 \$1,555		0.00 \$0	6.79 \$2,308
0913100200	CO-RAY-VA			FEEDER INSTA	•	7 13
Unit values Totals	0.15 17.88		, AND RECI 4.57 \$549		120.00 0.00 \$0	
A09 ELECTRICAL	69	\$1,019	\$2,104	\$0	\$0	\$3,123

Line #	Description	n				
	Manhours			Equipment	Sub	Total
*****	:==#==#=:	= # = = = = =		=======	======	
1517010650	W/CDLCC			CHEDULE 40,	330 00	, 4" DIAM L.F.
Unit values Totals	0.44 146.52	4.17 \$1,376	10.30 \$3,400	0.00 \$0	0.00 \$0	14.47 \$4,776
1517011310	GAS SERVICE	E PIPE ST	EEL GALV	SCH 40 THRI	W/CPLG	& HNGR SZD L.F.
Unit values Totals	FOR CVRG 10 0.13 57.15	1.64 \$738	2.88 \$1,294	0.00 \$0	0.00	4.52 \$2,032
1519010320	ALUMINUM R	EFLECTORS	W/HANGE	RS .	45.00	Pa
Unit values • Totals	0.50 22.50	39.79 \$1,791	3.80 \$171	0.00 \$0	0.00	43.59
1524105040	VACUUM PUMI	AND VEN	T PIPING		1.00	Po.
Unit values Totals		738.35 \$738	120.15 \$120	0.00 \$0	0.00	
1552301020	CRV-100 GAS	FIRED B	URNER, 1	00 MBH & C	MBUSTION 6.00	
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	
1554510160	CO-RAY-VAC	VANTAGE	2 INFA-	RD HTG UNT,	GAS 100M	
Unit values Totals			163.40 \$163	0.00 \$0	0.00	1228.40
1554510220	CO-RAY-VAC	VANTAGE	2 INFA-R	D HTG UNIT,	GAS 40 MI 4.00	
Unit values Totals	4.00 16.00	935.00 \$3,740	81.70 \$327	0.00 \$0		1016.70
1556800120	CO-RAY-VAC	VANTAGE	2 VENT P	IPE·	F 00	Eo
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382		5.00 0.00 \$0	146.50 \$732
1574205220	ELECTRIC TH	HERMOSTAT	W/ COVE	R AND WIRING	6.00	₽a
Unit values Totals	1.00	75.00 \$450	27.55 \$165		0.00 \$0	102.55 \$615

Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	======					
U15 MECHANIÇAL	272	\$15,408	\$6,286	\$0	\$0	\$21,694
1631200100	HEATING	SYSTEM POWE	R / CONTI	ROL PANEL		_
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	1.00 0.00 \$0	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

\_\_\_\_\_\_\_ Description Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ \$8,461 \$0 \$0 ESTIMATE TOTAL \$16,758 344 \$25,219 SALES TAX 0.00% \$0 \$0 0.00% MATL MARKUP LABOR MARKUP 0.00% \$0 EQUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% \$0 TOTAL BEFORE CONTINGENC \$16,758 \$8,461 \$0 \$0 \$25,219 0.00% CONTINGENCY \$0 \$0 BOND 0.00% \$0 PROFIT 0.00% JOB TOTAL \$25,219

\_\_\_\_\_\_\_ Estimate: BLDG 6143 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:

Location:

FORT KNOX, KY Job #:

94013.02

Sq. footage:

City indx:Louisville, KY 

STIMMARY				
	CT.	TR//R/	7 N T	) V

	D	Olumater		•		
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================			======:	=======================================	======:	=======
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	272	\$1,019 \$15,408 \$331	\$2,104 \$6,286 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$3,123 \$21,694 \$402
TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		Ψ.0	\$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0 \$0
JOB TOTAL						\$25,219

Estimate: BLDG 6144 Date: 14-Oct-94 COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: City indx:Louisville, KY Sq. footage: 8100.00 Description Equipment Matl Manhours Labor Sub \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 4"DIAMETER 400.00 L.F. Unit values 0.15 0.00 3.16 1.29 0.00 4.44 Totals 60.00 \$0 \$1,262 \$514 \$0 \$1,776 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 0.75 Ton Unit values. 14.55 0.00 380.36 0.00 0.00 380.36 Totals 10.91 \$0 \$285 \$0 \$0 \$285 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. Unit values 0.07 0.00 1.97 0.24 0.00 2.21 Totals 14.20 \$0 \$395 \$47 \$0 \$442 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 DIAMETER PIPE 70.00 Ea. 0.20 Unit values 0.00 5.55 0.68 0.00 6.23 Totals 14.00 \$0 \$389 \$47 \$0 \$436 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. Unit values 259,60 1.56 35.47 5.91 300.98 0.00 Totals 1.56 \$260 \$35 \$6 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 0.11 Unit values 1.92 2.96 0.17 0.00 5.06 Totals 5.35 \$148 \$96 \$9 \$0 \$253 U02 SITEWORK 107 \$356 \$2,514 \$623 \$0 \$3,493

	=	=======	=======			
Line #	Description	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	_========					
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See Atta	ched for 1	• .
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	25219.00	25219.00 \$25,219
1562600137	GAS APPLIA TYPE 1-1/4			BLE DIAPHR	AGM 1.00	Ea.
Unit values Totals	•	226.00 \$226	12.10 \$12	0.00 \$0	0.00 \$0	238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$25,219	\$25,457

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
==========	========		=======			
	100	ė E o o	\$2,526	\$623	¢25 210	<b>600 050</b>
ESTIMATE TOTAL	108	\$582	\$2,526	\$623	\$25,219	\$28,950
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0				
LABOR MARKUP	0.00%	4 -	\$0	\$0		
EQUIPT MARKUP SUB MARKUP	0.00%			, şu	\$0	
	ONTINGENC 10.00%	\$582	\$2,526	\$623	\$25,219	\$28,950 \$2,895
CONTINGENCY BOND	0.00%					\$0
PROFIT	10.00%			•		\$2,895
JOB TOTAL .						\$34,740

Estimate: BLDG 6144 Date: 14-Oct-94 Description: COST ESTIMATE

Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02
Sq. footage: 8100.00 City indx:Louisville, KY

SUMMARY				=======		
	Manhours	Matl	Labor	Equipment	Sub	Total
_===========	========	=======		=======================================	========	=======
U02 SITEWORK U15 MECHANICAL	107	\$356 \$226	\$2,514 \$12	\$623 \$0	\$0 \$25,219	\$3,493 \$25,457
TOTAL	108	\$582	\$2,526	\$623	\$25,219	\$28,950
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%		·	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,526	\$623	\$25,219	\$28,950 \$2,895 \$0 \$2,895
JOB TOTAL					•	\$34,740

A09 ELECTRICAL

69

\_\_\_\_\_\_ Estimate: BLDG 6144 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_ Labor Equipment Manhours Matl 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 340.00 L.F. Unit values 2.22 4.57 0.00 6.79 0.15 0.00 Totals 50.66 \$753 \$1,555 \$0 \$0 \$2,308 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 6.79 Unit values 0.15 2.22 4.57 . 0.00 0.00 \$0 \$266 \$549 \$0 \$815 Totals 17.88

\$1,019 \$2,104

\$0

\$0

\$3,123

==============	========	=======	=======	========	=======	========
Line #	Description	on				
	Manhours	Matl	Labor E	:quipment	Sub	Total
=======================================	:========	=======				
1517010650	BLACK STER	EL RADIANT	PIPE, SCH	EDULE 40,	THREADED,	4" DIAM L.F.
Unit values Totals	0.44 146.52	4.17 \$1,376	10.30 \$3,400	0.00 \$0	0.00	14.47 \$4,776
1517011310	GAS SERVIO	CE PIPE ST	EEL GALV S	SCH 40 THRI	W/CPLG & 450.00	HNGR SZD
Unit values Totals	FOR CVRG 1 0.13 57.15	1.64 \$738	2.88 \$1,294	0.00 \$0	0.00 \$0	4.52 \$2,032
1519010320	ALUMINUM F	REFLECTORS	W/HANGERS	3	45.00	Ea.
Unit values Totals	0.50 22.50	39.79 \$1,791	3.80 \$171	0.00 \$0	0.00	43.59 \$1,962
1524105040	VACUUM PUN	MP AND VEN	T PIPING		1.00	Ea
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00 \$0	0.00	858.50 \$858
1552301020	CRV-100 GA	AS FIRED B	URNER, 100	MBH & CC	MBUSTION 6.00	CHAMBER
Unit values Totals	1.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	904.06 \$5,424
1554510160	CO-RAY-VAC	C VANTAGE	2 INFA-RD	HTG UNT,	GAS 100ME 1.00	BH Ea
Unit values Totals	6.00 6.00	1065.00 \$1,065	163.40 \$163	0.00 \$0	0.00	1228.40 \$1,228
1554510220	CO-RAY-VAC	C VANTAGE	2 INFA-RD	HTG UNIT,	GAS 40 ME 4.00	BH Ea
Unit values Totals	4.00 16.00	935.00 \$3,740	81.70 \$327	0.00 \$0	0.00	1016.70
1556800120	CO-RAY-VAC	C VANTAGE	2 VENT PIP	PΕ	5.00	Fa
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382	0.00 \$0	0.00 \$0	146.50 \$732
1574205220	ELECTRIC T	THERMOSTAT	W/ COVER	AND WIRING	6.00	Ea.
Unit values Totals	1.00 6.00	75.00 \$450	27.55 \$165	0.00 \$0	0.00 \$0	102.55 \$615

Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======					
U15 MECHANICAL	272	\$15,408	\$6,286	\$0	\$0	\$21,694
1631200100	HEATING	SYSTEM POWER	R / CONTR	ROL PANEL	1.00	F-a
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

============	=======	=======	-======		=======	=======
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	=====:	========	=======================================	
ESTIMATE TOTAL	344	\$16,758	\$8,461	. \$0	\$0	\$25,219
SALES TAX MATL MARKUP	0.00%	\$0 \$0	ĊΩ			
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0
JOB TOTAL						\$25,219

Estimate: BLDG 6144 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY

Job #:

94013.02

Location: Sq. footage:

JOB TOTAL

City indx:Louisville, KY

bq. roodago.							
=======================================	s	UMMARY					
	Manhours	Matl	Labor	Equipment	Sub	Total	
=======================================	========						
A09 ELECTRICAL		\$1,019	\$2,104	\$0 \$0	\$0 \$0	\$3,123	
U15 MECHANICAL U16 ELECTRICAL		\$15,408 \$331	\$6,286 \$71	\$0 \$0 \$0	\$0 \$0	\$21,694 \$402	
TOTĄL	344	\$16,758	\$8,461	\$0	\$0	\$25,219	
SALES TAX	0.00%	\$0 \$0					
MATL MARKUP LABOR MARKUP	0.00%	\$0	\$0	4.0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			. \$0	\$0		
	ONTINGENC	\$16,758	\$8,461	\$0	\$0	\$25,219	
CONTINGENCY BOND	0.00% 0.00%					\$0 \$0 \$0	
PROFIT	0.00%					\$0	

\$25,219

\_\_\_\_\_\_ Date: 14-Oct-94 BLDG 6145 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY 8100.00 Sq. footage: Description Line # \_\_\_\_\_\_ Equipment Matl Labor Manhours - -SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 400.00 L.F. 4 "DIAMETER 3.16 1.29 4.44 Unit values 0.15 0.00 0.00 Totals 60.00 \$0 \$1,262 \$514 \$0 \$1,776 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 0.75 Ton 0.00 Unit values 14.55 0.00 380.36 0.00 380.36 \$0 \$0 \$0 Totals 10.91 \$285 \$285 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. 0.07 1.97 0.24 2.21 Unit values 0.00 0.00 \$0 \$395 \$47 \$0 \$442 Totals 14.20 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 70.00 Ea. DIAMETER PIPE 0.68 6.23 Unit values 0.20 0.00 5.55 0.00 \$0 \$389 \$47 \$0 \$436 14.00 Totals CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 35.47 5.91 300.98 Unit values 1.56 259.60 0.00 Totals \$6 1.56 \$260 \$35 \$0 \$301 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 0.17 0.00 5.06 Unit values 0.11 1.92 2.96 Totals 5.35 \$96 \$148 \$9 \$0 \$253 U02 SITEWORK 107 \$356 \$2,514 \$623 \$0 \$3,493

/========	========	========	=======	=======	========	========
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	=======	=======	:======:	
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See Att	ached for	Breakdown) LS
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		25219.00 \$25,219
1562600137	GAS APPLIA			BLE DIAPHE		_
Unit values Totals	TYPE 1-1/4 0.53 0.53		ZE 12.10 \$12	0.00 \$0	1.00 0.00 \$0	Ea. 238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$25,219	\$25,457

	========	=======	-======		========	=======
Line #	Descriptio	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	108	\$582	\$2,526	\$623	\$25,219	\$28,950
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SUB MARKUP	0.00%			·	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,526	\$623	\$25,219	\$28,950 \$2,895 \$0 \$2,895
JOB TOTAL						\$34,740

Estimate: BLDG 6145 Date: 14-Oct-94

Description:

COST ESTIMATE

Project:

LIMITED EEAP(GLASSBid Date:

Location:

FORT KNOX, KY Job #:

94013.02

Sq. footage: 8100.00

JOB TOTAL

City indx:Louisville, KY

SUMMARY \_\_\_\_\_ Manhours Matl Labor Equipment Sub Total \$356 \$2,514 \$623 \$0 \$3,493 107 U02 SITEWORK \$25,219 \$25,457 \$226 \$12 \$0 1 U15 MECHANICAL \$582 \$623 \$25,219 \$28,950 TOTAL 108 \$2,526 SALES TAX 0.00% \$0 0.00% \$0 MATL MARKUP \$0 0.00% LABOR MARKUP \$0 EQUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% TOTAL BEFORE CONTINGENC \$582 \$2,526 . \$623 \$25,219 \$28,950 \$2,895 CONTINGENCY. 10.00% \$0 BOND 0.00% \$2,895 10.00% PROFIT

\$34,740

A09 ELECTRICAL

Estimate: BLDG 6145 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Description Line # \_\_\_\_\_ Equipment Manhours Matl Labor 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 340.00 L.F. AND RECEPTACLES 2.22 4.57 0.00 6.79 Unit values 0.15 0.00 Totals 50.66 \$753 \$1,555 \$0 \$0 \$2,308 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 4.57 0.00 2.22 0.00 6.79 Unit values 0.15 \$0 \$0 \$815 \$266 \$549 Totals 17.88 69

\$1,019 \$2,104

\$0

\$0

\$3,123

\_\_\_\_\_\_

Line #	Description	on				
	Manhours			Equipment	Sub	Total
=======================================				=======		=======
1517010650	W/CDLCC			CHEDULE 40,	330 00	, 4" DIAM L.F.
Unit values Totals	0.44 146.52	4.17 \$1,376	10.30 \$3,400	0.00 \$0	0.00 \$0	14.47 \$4,776
1517011310						
Unit values Totals	0.13 57.15	1.64	2.88 \$1,294	0.00 \$0	0.00	4.52 \$2,032
1519010320	ALUMINUM F	REFLECTORS	W/HANGE	RS	45.00	<b>r</b> -2
Unit values Totals	0.50 22.50	39.79 \$1,791	3.80 \$171	0.00 \$0	0.00	43.59 \$1,962
1524105040	VACUUM PUN	IP AND VEN	T PIPING		1 00	R-
Unit values Totals	3.00	738.35 \$738	120.15 \$120	· 0.00 \$0	1.00 0.00 \$0	
1552301020	CRV-100 GA	S FIRED B	URNER, 10	00 MBH & CC	MBUSTION	CHAMBER
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	6.00 0.00 \$0	904.06 \$5,424
1554510160	CO-RAY-VAC	C VANTAGE	2 INFA-F	RD HTG UNT,	GAS 100M	
Unit values Totals	6.00 6.00		163.40 \$163	0.00 \$0	0.00	1228.40
1554510220	CO-RAY-VAC	VANTAGE	2 INFA-RI	HTG UNIT,		
Unit values Totals	4.00 16.00	935.00 \$3,740	81.70 \$327	0.00 \$0	4.00 0.00 \$0	1016.70 \$4,067
1556800120	CO-RAY-VAC	VANTAGE	2 VENT PI	IPE	Г 00	T o
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382		5.00 0.00 \$0	146.50 \$732
1574205220	ELECTRIC T	HERMOSTAT	W/ COVER	R AND WIRING		F-2
Unit values. Totals	1.00 6.00	75.00 \$450	27.55 \$165	0.00 \$0	6.00 0.00 \$0	102.55 \$615

Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========				
U15 MECHANICAL	272	\$15,408	\$6,286	\$0	\$0	\$21,694
1631200100	HEATING	SYSTEM POWE	R / CONTE	ROL PANEL	1.00	Fa
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 . \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

_======================================	=======	======				
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======	=========	=======	
ESTIMATE TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0	* ^			
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0
JOB TOTAL						\$25,219

Estimate:

BLDG 6145 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE

Description:

LIMITED EEAP(GLASSBid Date:

Project: Location:

FORT KNOX, KY Job #: 94013.02

Sq. footage:

City indx:Louisville, KY

sq. rootage:							
	SUMMARY						
	Manhours	Matl	Labor	Equipment	Sub	Total	
	=======		=======				
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	272	\$1,019 \$15,408 \$331	\$2,104 \$6,286 \$71	. \$0 \$0 \$0	\$0 \$0 \$0	\$3,123 \$21,694 \$402	
TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219	
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0			
SUB MARKUP	0.00%			ŞŪ	\$0		
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0 \$0	
JOB TOTAL						\$25,219	

BLDG 6146 Date: 14-Oct-94 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: City indx:Louisville, KY Sq. footage: 8100.00 Description \_\_\_\_\_ Matl Labor Equipment Manhours \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 4"DIAMETER 400.00 L.F. Unit values 0.15 0.00 3.16 1.29 0.00 4.44 Totals 60.00 \$0 \$1,262 \$514 \$0 \$1,776 0207180380 HVAC DEMO, BOILER GAS/OIL STL >150MBH 1.00 Ea. Unit values 12.00 0.00 323.82 0.00 0.00 323.82 Totals 12.00 \$0 \$324 \$0 \$0 \$324 0207183600 HVAC DEMO, MECH EOPT HEAVY ITEM 0.75 Ton Unit values. 14.55 0.00 380.36 0.00 0.00 380.36 \$0 Totals 10.91 \$0 \$285 \$0 \$285 0208400600 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 200.00 L.F. 0.00 1.97 0.24 Unit values 0.07 0.00 2.21 \$395 Totals \$47 14.20 \$0. \$0 \$442 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 DIAMETER PIPE 70.00 Ea. Unit values 0.20 0.00 5.55 0.68 0.00 6.23 \$47 Totals 14.00 \$0 \$389 \$0 \$436 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. Unit values 259.60 35.47 5.91 300.98 1.56 0.00 Totals \$6 1.56 \$260 \$35 \$0 \$301 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values 0.11 1.92 2.96 0.17 0.00 5.06 Totals 5.35 \$96 \$148 \$9 \$0 \$253 U02 SITEWORK \$2,838 \$623 \$3,817 119 \$356 \$0

		======			=======	========				
Line #	Description									
	Manhours	Matl	Labor	Equipment	Sub	Total				
1554510245	HTG INFA-RI	UNT GAS	ELEC IGN	I (See Att	ached for	Breakdown)				
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	25219.00					
1562600137	GAS APPLIANCE REGULATORS DOUBLE DIAPHRAGM TYPE 1-1/4" PIPE SIZE 1.00 Ea.									
Unit values Totals	0.53		12.10	0.00 \$0						
U15 MECHANICAL	1	\$226	\$12	\$0	\$25,219	\$25,457				

<b>/</b> ====================================	========	======			=======				
Line #	Description								
	Manhours	Matl	Labor	Equipment	Sub	Total			
=======================================	:======	======				===== <b>=</b>			
ESTIMATE TOTAL	120	\$582	\$2,850	\$623	\$25,219	\$29,274			
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0						
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0				
TOTAL BEFORE C CONTINGENCY BOND	ONTINGENC 10.00% 0.00%	\$582	\$2,850	\$623	\$25,219	\$29,274 \$2,927 \$0			
PROFIT	10.00%					\$2,927			
JOB TOTAL						\$35,129			

Estimate: BLDG 6146

Date:

14-Oct-94

Description:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

Project: Location:

JOB TOTAL

FORT KNOX, KY

94013.02 Job #:

Sq. footage: 8100.00

City indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub Total \_\_\_\_\_\_\_\_ \$0 \$2,838 \$623 U02 SITEWORK 119 \$356 \$3,817 \$25,219 \$0 \$25,457 U15 MECHANICAL \$226 \$12 \$2,850 \$623 \$25,219 \$582 \$29,274 TOTAL 120 SALES TAX 0.00% \$0 \$0 MATL MARKUP 0.00% \$0 LABOR MARKUP 0.00% EQUIPT MARKUP \$0 0.00% \$0 SUB MARKUP 0.00% \$623 TOTAL BEFORE CONTINGENC \$582 \$2,850 \$25,219 \$29,274 \$2,927 CONTINGENCY 10.00% \$0 0.00% BOND \$2,927 10.00% PROFIT

\$35,129

A09 ELECTRICAL

69

Estimate: BLDG 6146 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Line # Description Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 340.00 L.F. AND RECEPTACLES 6.79 0.15 4.57 0.00 0.00 2.22 Unit values \$1,555 \$0 \$0 \$753 \$2,308 Totals 50.66 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 17.88 \$266 \$549 \$0 \$0 \$815

\$1,019 \$2,104 · \$0

\$0

\$3,123

===========	=======================================	=======================================	=======================================
Line #	Description		
	Manhours Matl	Labor Equipment	Sub Total
=======================================	=======================================	=======================================	
1517010650	BLACK STEEL RADIANT		330.00 L.F.
Unit values Totals	0.44 4.17 146.52 \$1,376	10.30 0.00 \$3,400 \$0	0.00 14.47 \$0 \$4,776
1517011310	GAS SERVICE PIPE ST	EEL GALV SCH 40 THR DIAM	450.00 L.F.
Unit values Totals	FOR CVRG 10'OC 1/2" 0.13 1.64 57.15 \$738	2.88 0.00 \$1,294 \$0	0.00 4.52
1519010320	ALUMINUM REFLECTORS	W/HANGERS	45.00 Ea.
Unit values Totals	0.50 39.79 22.50 \$1,791	3.80 0.00 \$171 \$0	0.00 43.59
1524105040	VACUUM PUMP AND VEN	T PIPING	1 00 H-
Unit values Totals	3.00 738.35 3.00 \$738	120.15 0.00 \$120 \$0	
1552301020	CRV-100 GAS FIRED B	URNER, 100 MBH & C	OMBUSTION CHAMBER
Unit values Totals	1.00 860.00 6.00 \$5,160	44.06 0.00 \$264 \$0	6.00 Ea. 0.00 904.06 \$0 \$5,424
1554510160	CO-RAY-VAC VANTAGE	2 INFA-RD HTG UNT,	
Unit values Totals	6.00 1065.00 6.00 \$1,065	163.40 0.00 \$163 \$0	
1554510220	CO-RAY-VAC VANTAGE	2 INFA-RD HTG UNIT,	
Unit values Totals	4.00 935.00 16.00 \$3,740	81.70 0.00 \$327 \$0	4.00 Ea. 0.00 1016.70 \$0 \$4,067
1556800120	CO-RAY-VAC VANTAGE	2 VENT PIPE	5.00.7.
Unit values Totals	1.60 70.00 8.00 \$350	76.50 0.00 \$382 \$0	5.00 Ea. 0.00 146.50 \$0 \$732
1574205220	ELECTRIC THERMOSTAT	W/ COVER AND WIRIN	
Unit values Totals	1.00 75.00 6.00 \$450	27.55 0.00 \$165 \$0	6.00 Ea. 0.00 102.55 \$0 \$615

Line # ·	Descripti	.on		•		
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======					
U15 MECHANICAL	272	\$15,408	\$6,286	\$0	\$0	\$21,694
1631200100	HEATING S	SYSTEM POWE	R / CONTI	ROL PANEL	1.00	To.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

/ ====================================		======	========	=========	========	
Line #	Descripti	.on				
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP ·	0.00% 0.00%		1.	. \$0	\$0	
TOTAL BEFORE CO CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0
JOB TOTAL						\$25,219

Estimate: BLDG 6146 Date: 14-Oct-94

Description:

INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP (GLASSBID Date:

Project: •

FORT KNOX, KY

Job #:

94013.02

Location: Sa footage:

JOB TOTAL

City indx:Louisville, KY

Sq. rootage:			CICA INOX	. 110015	, KI	
=======================================	S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	69 272 3	\$1,019 \$15,408 \$331	\$2,104 \$6,286 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$3,123 \$21,694 \$402
TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0

\$25,219

BLDG 6147 Date: 14-Oct-94 Description: COST ESTIMATE LIMITED EEAP (GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: 8100.00 City indx:Louisville, KY Sq. footage: \_\_\_\_\_\_ Description Line # Matl Labor Equipment Manhours Sub \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 4"DIAMETER 400.00 L.F. Unit values. 0.15 0.00 1.29 3.16 0.00 4.44 60.00 Totals \$0 \$514 \$0 \$1,262 \$1,776 0207183600 HVAC DEMO, MECH EQPT HEAVY ITEM 0.75 Ton Unit values 0.00 0.00 380.36 14.55 380.36 0.00 Totals 10.91 \$0 \$285 \$0 \$0 \$285 0208400600 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 200.00 L.F. 0.24 Unit values 0.07 0.00 1.97 0.00 2.21 Totals 14.20 \$0 \$395 \$47 \$0 \$442 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 70.00 Ea. DIAMETER PIPE Unit values 0.20 0.00 5.55 0.68 0.00 6.23 Totals 14.00 \$0 \$389 \$47 \$0 \$436 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. Unit values 1.56 259.60 35.47 5.91 0.00 300.98 Totals \$6 1.56 \$260 \$35 \$0 \$301 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values: 0.11 1.92 2.96 0.17 0.00 5.06 Totals \$96 5.35 \$148 \$9 \$0 \$253 U02 SITEWORK 107 \$356 \$2,514 \$623

\$0

\$3,493

	=========	======			=======	
Line #	Description					
•	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
1554510245	HTG INFA-RD	UNT GAS	ELEC IGN	N (See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0	25219.00	25219.00 \$25,219
1562600137	GAS APPLIAN			JBLE DIAPHR		_
Unit values Totals	TYPE 1-1/4" 0.53 0.53	226.00	ZE 12.10 \$12	0.00 \$0	1.00 0.00 \$0	
U15 MECHANICAL	1	\$226	\$12	\$0	\$25,219	\$25,457

\_\_\_\_\_\_

Description Labor Equipment Sub Manhours Matl \_\_\_\_\_\_ 108 \$582 \$2,526 \$623 \$25,219 \$28,950 ESTIMATE TOTAL \$0 SALES TAX 0.00% \$0 MATL MARKUP 0.00% \$0 0.00% LABOR MARKUP \$0 EQUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% TOTAL BEFORE CONTINGENC \$582 \$2,526 \$623 \$25,219 \$28,950 CONTINGENCY 10.00% \$2,895 BOND 0.00% \$0 PROFIT 10.00% \$2,895 JOB TOTAL \$34,740

\_\_\_\_\_\_\_ Estimate: BLDG 6147 Date: 14-Oct-94
Description: COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02
Sq. footage: 8100.00 City indx:Louisville, KY

SUMMARY

	. 50	JIMMAR I				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=========				======	=======
U02 SITEWORK U15 MECHANICAL	107 1	\$356 \$226	\$2,514 \$12	\$623 \$0	\$0 \$25,219	\$3,493 \$25,457
TOTAL	108	\$582	\$2,526	\$623	\$25,219	\$28,950
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%		, -	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,526	\$623	\$25,219	\$28,950 \$2,895 \$0 \$2,895
JOB TOTAL				•		\$34,740

18-Oct-94

\_\_\_\_\_\_ Estimate: BLDG 6147 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Line # Description Manhours Matl Labor Equipment Sub 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 340.00 L.F. AND RECEPTACLES 6.79 4.57 0.00 0.00 2.22 Unit values 0.15 \$1,555 \$0 \$0 \$2,308 \$753 Totals 50.66 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 6.79 Unit values 0.15 2.22 4.57 0.00 0.00 Totals 17.88 \$266 \$549 \$0 \$0 \$815 \$0 \$0 \$3,123 A09 ELECTRICAL 69 \$1,019 \$2,104

Line #	Description	·	
	Manhours Matl	Labor Equipment	Sub Total
=======================================	=======================================		
1517010650	W/CPI.GS	r PIPE, SCHEDULE 40,	330.00 L.F.
Unit values Totals	0.44 4.17	10.30 0.00 \$3,400 \$0	0.00 14.47 \$0 \$4,776
1517011310	GAS SERVICE PIPE ST FOR CVRG 10'OC 1/2'		450 00 5 5
Unit values Totals	0.13 1.64 57.15 \$738	' DIAM 2.88 0.00 \$1,294 \$0	0.00 4.52 \$0 \$2,032
1519010320	ALUMINUM REFLECTORS	S W/HANGERS	45.00 Ea.
Unit values Totals	0.50 39.79 22.50 \$1,791	3.80 0.00 \$171 \$0	0.00 43.59
1524105040	VACUUM PUMP AND VE	NT PIPING	1.00 Ea.
Unit values Totals	3.00 738.35 3.00 \$738		0.00 858.50
1552301020	CRV-100 GAS FIRED F	BURNER, 100 MBH & CO	OMBUSTION CHAMBER 6.00 Ea.
Unit values Totals	1.00 860.00 6.00 \$5,160	44.06 0.00 \$264 \$0	0.00 Ea. 0.00 904.06 \$0 \$5,424
1554510160	CO-RAY-VAC VANTAGE	2 INFA-RD HTG UNT,	GAS 100MBH 1.00 Ea.
Unit values Totals	6.00 1065.00 6.00 \$1,065	163.40 0.00 \$163 \$0	0.00 1228.40 \$0 \$1,228
1554510220	CO-RAY-VAC VANTAGE	2 INFA-RD HTG UNIT,	GAS 40 MBH 4.00 Ea.
Unit values Totals	4.00 935.00 16.00 \$3,740	81.70 0.00 \$327 \$0	0.00 1016.70 \$0 \$4,067
1556800120	CO-RAY-VAC VANTAGE	2 VENT PIPE	5.00 Ea.
Unit values Totals	1.60 70.00 8.00 \$350	76.50 0.00 \$382 \$0	
1574205220	ELECTRIC THERMOSTAT	W/ COVER AND WIRING	6.00 Ea.
Unit values Totals		27.55 0.00 \$165 \$0	

Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	======	========				
U15 MECHANICAL	272	\$15,408	\$6,286	\$0	\$0	\$21,694
1631200100	HEATING	SYSTEM POWE	R / CONT	ROL PANEL	1.00	Ea.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

	=======	========				-======
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
	======		_ = = = = =			
ESTIMATE TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0
JOB TOTAL						\$25,219

Estimate: BLDG 6147 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02

Job #: 94013.02

Sq. footage:		·	City indx	:Louisville,	, KY 	
=======================================	======= S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
_==========	========	=======	=======	=======		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	272	\$1,019 \$15,408 \$331	\$2,104 \$6,286 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$3,123 \$21,694 \$402
TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	•		
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0
JOB TOTAL						\$25,219

			-						
	<b>!</b>	T KNO	LIMIT	FT KNOX LIMITED EEAP (GLASS)	<u>)</u>	SLASS)		•	,
	E	ECO - 1: INF	INFRARED	HEATING CALCULATIONS	CC	JLATIONS			
_								PAGE	1 OF 3
BUILDING NUMBER:	6113		BUILDING I OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60	, , , , , , , , , , , , , , , , , , , ,		
INFILTRATION LOSSES =		_ AIR CHGS X	114900	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.13	MBTU / HR
FLOOR LOSSES =	350	LINEAR FEET	FEET OF PE	OF PERIMETER X	59	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
FACE BRICK/BLK WALL =		- AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.07	MBTU / HR
CORR MTL PNL WALL =	1165	_AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	_AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.06	MBTU / HR
TINTED DBL PANE WIN'W=	•	AREA (SF) X	0.65	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	И	0.00	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	u	0.04	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	- AREA (SF) X -	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL BASELINE HEAT LOSSES	INE I	HEAT LOSSES	11 1	0.37	MBTU / HR

	S
	Ś
	٩
	궀
	$\mathcal{L}$
	<u>α</u>
	4
	H.
	ш
٠	
	≥
	×
	0
	Z
	X
	H
	Щ.

# **ECO - 1: INFRARED HEATING CALCULATIONS**

							PAGE 2	2 OF 3
BUILDING NUMBER:	6113		SUILDING SUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	55	<u> </u>		
INFILTRATION LOSSES =	~	AIR CHGS X	114900	VOL (CU FT) X 54 F TEMP DIFF	DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR FEET OF		PERIMETER X 54 F TEMP DIFF	DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU) 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	. 11	90.0	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	54 F	TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	0.65	. 54 F	TEMPERATURE DIFFERENCE	H	00.0	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	П	0.04	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	H	00.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	II	00.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25 .	AREA (SF) X	0.615	U VALUE (BTU/ 54 F TE HR-SF-F) X 54 DIF	TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL ECO HEAT LOSSES	SES	11 11	0.34 355.37	MBTU / HR MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1	
SYSTEM EFFICIENCY	%09	%06	
OUTSIDE DESIGN TEMP (F)	-	-	
HTG TEMP SETPOINT (F)	09	55	
HEATING DEGREE DAYS	4616	3396	
TOTAL HEAT LOSSES (MBTU / HR)	0.37	0.34	
\$ /MBTU -FUEL OIL	\$6.60	\$6.60	
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
\$ /MBTU -PPG	\$10.84	\$10.84	

BUILDING NUMBER	6113
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
= CONSTANT FOR SLA	81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
DRR FACTOR = EMPIR	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
F DEGREE-DAYS FROM	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

A	ANNUAL HEATII		GY C	<b>NG ENERGY CONSUMPTION (DEGREE DAY METHOD)</b>	DAY I	METHOL	6	
BASELINE =	0.37	MBTU / HR X	4616	IBTU/HR X 4616 DEGREE DAYS X 24 HRS/DAY		, ,	i i	
	9.0	SYS EFF X	99 29	SYS EFF X 59 LEMP DIFFERENCE	<b>1</b> 1	1,151./6	MBIU/YR	
	1,151.76	MBTU/YR	×	CORR FACTOR 1	11		1,151.76	MBTU/YR
ECO - 1 =	0.34	MBTU / HR X	3396	IBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY				
-	0.0	SYS EFF X	54	SYS EFF X 54 TEMP DIFFERENCE	11	564.90	MBTU/YR	
	564.90	MBTU/YR	×	CORR FACTOR 1	н	í	564.90	MBTU/YR
	ECO - 1	ANNUAL HEATI	NG E	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	<b>81 II</b>		586.86	MBTU/YR

	ANNUAL	ANNUAL HEATING ENERGY COST	NERG	Y COST				
BASELINE =	1,151.76	MBTU/YR X 6.6	9.9	\$ /MBTU	11	7,601.62 \$ /YR	\$ /YR	
ECO - 1=	564.90	MBTU/YR X 4.62	4.62	\$ /MBTU	11	: 2,609.84 \$ /YR	\$ /YR	
	ECO - 1 ANNL	JAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 4,991.77 \$ /YR	II	4,991.77	\$ MR	

	S
	iń
	נַט
	<b>(</b>
	7
	U
	П
	1
	$\sim$
	Щ
	Ш
*	
	面
	ш
	⊢
	<u>:</u>
	5
	_
	×
	$\approx$
	U
	7
	<b>X</b>
	LL.

# **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAGE	1 OF 3
BUILDING NUMBER:	6114		BUILDING HOUTSIDE DITEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60	<u></u>		
INFILTRATION LOSSES =		_ AIR CHGS X	114900	VOL (CU FT) X	29	F TEMP DIFF X 0.019	11	0.13	MBTU / HR
FLOOR LOSSES=	350	LINEAR F	EAR FEET OF PERIMETER	METER X	29	F TEMP DIFF X 0.81	II	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	li	0.07	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	П	90.0	MBTU / HR
TINTED DBL PANE WIN'W =	-	AREA (SF) X	0.65	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	H	0.04	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL= -	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCÉ	11	0.00	MBTU / HR
				TOTAL BASELINE HEAT LOSSES	NE H	EAT LOSSES	B II	0.37 388.28	MBTU / HR MJ/HR

	. [	FT KNOX	Z	OX LIMITED EEAP	EEAP (GLASS)		•	
	Й	ECO - 1: INFF	RAREI	INFRARED HEATING CALCULATIONS	CULATIONS	•		
BUILDING NUMBER:	6114	•	BUILDI	BUILDING HEATING TEMPERATURE SETPOINT:	ATURE SETPOINT: 55		PAGE	2 OF 3
			OUTSI	OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	URE	LL LL		
INFILTRATION LOSSES =	<del>-</del>	AIR CHGS X	114900	VOL (CUFT) X	54 F TEMP DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR FEET OF	FEET OF	PERIMETER X	54 F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54 F TEMPERATURE	11	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176		54 F TEMPERATURE DIFFERENCE	Н	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389		54 F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	( 0.17		54 F TEMPERATURE DIFFERENCE	II	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	( 1.235		54 F TEMPERATURE DIFFERENCE	н	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	; 0.65	U VALUE (BTU/ HR-SF-F) X	54 F TEMPERATURE *	. 11	0.00	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54 F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	( 0.214	4 U VALUE (BTU/ HR-SF-F) X	54 F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	( 0.56	U VALUE (BTU/ HR-SF-F) X	54 F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	( 0.56	U VALUE (BTU/ HR-SF-F) X	54 F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED ÞERSONNEL=	25	AREA (SF) X	( 0.615	5 U VALUE (BTU/ HR-SF-F) X	54 F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR
				TOTAL ECC	TOTAL ECO HEAT LOSSES	н п	0.34	MBTU / HR MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	11000	, 001
	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	~
HTG TEMP SETPOINT (F)	. 09	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	76.0	76.0
(MBTU / HR)	5.0	
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
AMRTII DPG	\$10 84	\$10.84

6114	GLOSSARY OF TERMS			81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2
BUILDING NUMBER		1055 MJ	ISTANT	STANT FOR SLAB!	TOR = EMPIRICA	REE-DAYS FROM A
BUILDIN		1 MBTU = $1055  MJ$	0.019=CONSTANT	.81 = CON	CORR FAC	65 F DEGF

<b>A</b>	ANNUAL HEATIN	TING ENERG	ŏ ≻	IG ENERGY CONSUMPTION (DEGREE DAY METHOD)	λAζ	METHOL	(6)	
BASELINE =	0.37	MBTU/HR X 46 SYS EFF X 5	516 59 7	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	11	1,151.76	MBTU/YR	
	1,151.76	MBTU/YR	×	CORR FACTOR 1	11		1,151.76	MBTU/YR
ECO - 1=	0.34	MBTU/HR X 33	396 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	. 11	564.90	MBTUYR	
	564.90	MBTU/YR	×	CORR FACTOR 1	H	ı	564.90	MBTU/YR
	ECO - 1	ANNUAL HEATING	G EN	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 11		586.86 619,135.94	MBTU/YR MJ/YR

	ANNOAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST				Т
BASELINE =	1,151.76	MBTU/YR X 6.6	9.9	\$ /MBTU	П	7,601.62 \$ /YR	\$ /YR	
ECO - 1 =	564.90	MBTU/YR X 4.62	4.62	\$ /MBTU	11	= 2,609.84 \$ /YR	\$ /YR	
	ECO - 1 ANNL	JAL HEATING E	NERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 4,991.77 \$ MR	11	4,991.77	\$ MR	

		FT KNOX	NOX LIMITED	ED EEAP	9)	EEAP (GLASS)			
.,,,	В	ECO - 1: INFR	ARED	: INFRARED HEATING CALCULATIONS	CCI	JLATIONS			
							-	PAGE 1	1 OF 3
BUILDING NUMBER:	6115		BUILDING H OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60			
INFILTRATION LOSSES =	-	AIR CHGS X	114900	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.13	MBTU / HR
FLOOR LOSSES =	350	LINEAR FE	LINEAR FEET OF PERIMETER	RIMETER X	29	F TEMP DIFF X 0.81	II	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.07	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	- AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.06	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	и.	0.00	MBTU / HR
. METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	H	0.04	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	lŧ	0.00	MBTU / HR
		ı		TOTAL BASEI	Ä.	TOTAL BASELINE HEAT LOSSES	11	0.37	MBTU / HR

	. [	T KNOX	LIMI	FT KNOX LIMITED EEAP (GLASS)	9	LASS)	•		
	ECO -		ARED	1: INFRARED HEATING CALCULATIONS	ರ	JLATIONS			
•								PAGE	PAGE 2 OF 3
BUILDING NUMBER:	6115		BUILDING OUTSIDE TEMPER	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATURE TURE	E SETPOINT: 55	<u>ш. ш. ш.</u>		
INFILTRATION LOSSES =	-	AIR CHGS X	114900	VOL (CUFT) X 54 F TEMP DIFF	54 F	TEMP DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR F	EET OF P	LINEAR FEET OF PERIMETER X	54 F	F TEMP DIFF X 0.81	u	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	))X	24	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	24	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	092	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE.	11	0.00	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	If	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II.	0.00	MBTU / HR

MBTU / HR MJ/HR

0.34 355.37

11 11

**TOTAL ECO HEAT LOSSES** 

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	<u> </u>								,-
ECO - 1	%06	-	55	3396	0 34	5	\$6.60	\$4.62	\$10 R4
BASELINE	%09	_	09	4616	0.37	5	\$6.60	\$4.62	\$10 84
	SYSTEM EFFICIENCY	OUTSIDE DESIGN TEMP (F)	HTG TEMP SETPOINT (F)	HEATING DEGREE DAYS	TOTAL HEAT LOSSES	(MBTU / HR)	\$ /MBTU -FUEL OIL	\$ /MBTU -NATURAL GAS	Dad Haw &

BUILDING NUMBER 6115  GLOSSARY OF TERMS  1 MBTU = 1055 MJ  0.019=CONSTANT  .81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE  CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS  65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2
--

4	ANNUAL HEATIN	TING ENERGY	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	JAY METI	( <u>ao</u> )	
BASELINE =	0.37	MBTU/HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	= 1,151.76	6 MBTU/YR	
	1,151.76	MBTU/YR X	CORR FACTOR 1	11	1,151.76	MBTU/YR
ECO - 1=	0.34	MBTU/HR X 3396 SYS EFF X 54	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	= 564.90	MBTU/YR	
	564.90	MBTU/YR X	CORR FACTOR 1	11	564.90	MBTU/YR
	ECO - 1 ANNI	ANNUAL HEATING E	UAL HEATING ENERGY CONSUMPTION SAVINGS	п п	586.86 619,135.94	MBTU/YR MJ/YR

	ANNUAL	ANNUAL HEATING ENERGY COST	NERG	Y COST				
BASELINE =	1,151.76	MBTU/YR X 6.6	9.9	\$ /MBTU	II	= 7,601.62 \$ /YR	\$ /YR	
ECO - 1 =	564.90	MBTU/YR X 4.62	4.62	\$ /MBTU	11	2,609.84 \$ /YR	\$ /YR	
	ECO - 1 ANNI	JAL HEATING E	NERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 4,991.77 \$ //R	II	4,991.77	\$ /YR	

_	
S	
S	
٩	
1	
$\subseteq$	
<u>α</u>	
4	
Щ	
Ш	
Ш	
≥	
2	
$\stackrel{\smile}{=}$	
$\mathbf{Z}$	
匠	

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	•			•					PAGE	PAGE 1 OF 3
	BUILDING NUMBER:	6116	1	BUILDING FOUTSIDE DITEMPERATION	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATURI TURE	E SETPOINT: 60	<u></u>		
	INFILTRATION LOSSES = _		_ AIR CHGS X	114900	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.13	MBTU / HR
	FLOOR LOSSES =	350	LINEAR F	LINEAR FEET OF PERIMETER	RIMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
	FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
	8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.07	MBTU / HR
	CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
	CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
	TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ ḤR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
	METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
	METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
	METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	ti	00.0	MBTU / HR
	MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	Ħ	00.00	MBTU / HR
_								İ		

MBTU / HR MJ/HR

11 11

TOTAL BASELINE HEAT LOSSES

-	压	T KNOX I	LIMIT	' KNOX LIMITED EEAP (GLASS)	-ASS)			
	EC(	O - 1: INFR	RED !	ECO - 1: INFRARED HEATING CALCULATIONS	LATIONS			
BUILDING NUMBER:	6116		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	55	шшш	PAGE 2	2 OF 3
INFILTRATION LOSSES =	<del></del>	AIR CHGS X	114900	VOL (CUFT) X 54 FT	54 F TEMP DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR FEET OF PERIMETER	ET OF PE	X 54	F TEMP DIFF X 0.81	ii	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ 54 F HR - SF - F) X	: TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ 54 F HR - SF - F) X	_	Ħ	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ 54 F HR-SF-F) X		н	90.0	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU) 54 F HR - SF - F) X		II	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ 54 F HR-SF-F) X	_	H	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ 54 F HR-SF-F) X		н	0.00	, MBTU/HR
METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	Ú VALUE (BTU/ 54 F HR-SF-F) X		II	0.04	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ 54 F HR-SF-F) X		H	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 F HR-SF-F) X		н	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 F HR-SF-F) X	TEMPERATURE DIFFERENCE	ti	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ 54 F HR - SF - F) X	TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL ECO HEAT LOSSES	LOSSES	11 11	0.34 355.37	MBTU / HR MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	<del>-</del>
HTG TEMP SETPOINT (F)	09	22
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0.37	0.34
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

BUILDING NUMBER 6116	GLOSSARY OF TERMS	.U = 1055 MJ	=CONSTANT	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2
BUILDING		1 MBTU = 1055 MJ	0.019=CONSTANT	.81 = CONST	CORR FACT	65 F DEGREI

	ANNUAL HEA	TING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	REE DA	Y METHO	(a	
BASELINE =	0.37	MBTU/HR X 4616 SYS EFF X 59	TU / HR X 4616 DEGREE DAYS X 24 HRS/DAY EFF X 59 TEMP DIFFERENCE	'DAY	1,151.76	MBTU/YR	
	1,151.76	MBTU/YR X	CORR FACTOR 1			1,151.76	MBTU/YR
ECO - 1=	0.34	MBTU/HR X 3396 SYS EFF X 54	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE .	/DAY =	564.90	MBTU/YR	
	564.90	MBTU/YR X	CORR FACTOR 1	11		564.90	MBTU/YR
	ECO -1 ANNU	ANNUAL HEATING	IAL HEATING ENERGY CONSUMPTION SAVINGS	NINGS =		586.86 619,135.94	MBTU/YR MJ/YR

	ANNUAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST			
BASELINE =	1,151.76	MBTU/YR X 6.6	6.6	\$ /MBTU	II	= 7,601.62 \$ /YR	\$ /\R
ECO - 1 =	564.90	MBTU/YR X 4.62	4.62	\$ /MBTU	ıı .	: 2,609.84 \$ /YR	\$ YR
	ECO - 1 ANNI	JAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 4,991.77 \$ /YR	11	4,991.77	\$ MR

		T KNOX	LIMIT	FT KNOX LIMITED EEAP (GLASS)	9	SLASS)		•	
	Ш	ECO - 1: INFR	INFRARED I	HEATING CALCULATIONS	$\Box$	JLATIONS			
								PAGE	PAGE 1 OF 3
BUILDING NUMBER:	6117		BUILDING H DUTSIDE DI TEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60	<u></u>		
INFILTRATION LOSSES =	-	AIR CHGS ·X	114900	VOL (CU FT) X	29	F TEMP DIFF X 0.019	H	0.13	MBTU / HR
FLOOR LOSSES =	350	LINEAR FE	LINEAR FEET OF PERIMETER	IMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	li	0.04	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.07	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	u	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) · X	.1.235	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE		90.0	MBTU / HR
TINTED DBL PANE WIN'W=		AREA (SF). X	. 0.65	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.04	MBTU/HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	. 0.00	MBTU / HR

MBTU / HR MJ/HR

0.37 388.28

н п

TOTAL BASELINE HEAT LOSSES

		KNOX		IMIT	FT KNOX LIMITED EEAP (GLASS)	9	SLASS)		•	
	EC	ECO - 1: INFRARED	RA		HEATING CALCULATIONS	r C	JLATIONS			
									PAGE	2 OF 3
BUILDING NUMBER:	6117		шОР	SUILDING OUTSIDE FEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUI TURE	E SETPOINT: 55	j <u>u. u. u.</u>		
INFILTRATION LOSSES =	<del>-</del>	AIR CHGS	×	114900	VOL (CUFT) X		54 F TEMP DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR FEET OF	E E		PERIMETER X	54 F	F TEMP DIFF X 0.81	ll II	0.02	MBTU / HR
SURFACE HEAT LOSSES										
FLAT BUILT UP ROOF =	0069	AREA (SF)	×	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	, II	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF)	×	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF)	×	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF)	×	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF)	×	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	u	0.05	MBTU / HR
. TINTED DBL PANE WIN'W =	0	AREA (SF)	×	• 0.65	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	ıī	0.00	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF)	×	0.214	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF)	×	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR -
					TOTAL ECC	O HE	TOTAL ECO HEAT LOSSES	II	0.34	MBTU / HR
								II	355.37	MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	~-	<del></del>
HTG TEMP SETPOINT (F)	09	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES (MBTU / HR)	0.37	0.34
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

BUILDING NUMBER 6117	GLOSSARY OF TERMS	1 MBTU = 1055 MJ	0.019=CONSTANT	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2
BUILDIN		1 MBTU =	0.019=COI	.81 = CON	CORR FAC	65 F DEGF

A	ANNUAL HEATIN	TING ENERGY	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	E DAY	METHO	(a	
BASELINE =	0.37	MBTU / HR X 461 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	II 	1,151.76	MBTU/YR	
	1,151.76	MBTU/YR X	CORR FACTOR 1	11		1,151.76	MBTU/YR
ECO - 1 =	0.34	MBTU/HR X 339 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DJFFERENCE	II 	564.90	MBTU/YR .	
	564.90	MBTU/YR X	CORR FACTOR 1	11		564.90	MBTU/YR
	ECO - 1	ANNUAL HEATING	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	။ ။ 8		586.86 619,135.94	MBTU/YR MJ/YR

	ANNOAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST				
BASELINE =	1,151.76	1,151.76 MBTU/YR X 6.6	9.9	\$ /MBTU	ш.	7,601.62 \$ /YR	\$ MR	
ECO - 1 =	564.90	MBTU/YR X 4.62	4.62	\$ /MBTU	11	= 2,609.84 \$ /YR	_\$ /YR	
	FCO - 1 ANNI	JAL HEATING E	ENERGY	FCO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 4 991 77 \$ /YR	11	4.991.77	S YR	

# **ECO - 1: INFRARED HEATING CALCULATIONS**

									PAGE 1	1 OF 3
	BUILDING NUMBER:	6118	ı	BUILDING F OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE URE	E SETPOINT: 60	╛ <del>╙╙</del> ╙		
	INFILTRATION LOSSES =		_ AIR CHGS X	114900	VOL (CUFT) X	29	F TEMP DIFF X 0.019	II	0.13	MBTU / HR
	FLOOR LOSSES =	350	LINEAR	R FEET OF PERIMETER	RIMETER X	59	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
	FACE BRICK/BLK WALL =		– AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.07	MBTU / HR
	CORR MTL PNL WALL =	1165	– AREA (SF) X	( 0.17	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	И	0.01	MBTU / HR
	CLR SGL PANE WINDOWS =	760	AREA (SF) X	( 1.235	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
	TINTED DBL PANE WIN'W =	•	– AREď (SF) X	ν 0.65	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	METAL ROLL UP DOORS =	1344	AREA (SF)	X 0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
	METAL GLAZED O'HEAD DR =		AREA (SF)	X 0.214	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
	LG MTL SLIDING DOOR =		— AREA (SF) >	X 0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
	METAL PERSONNEL DR=		— AREA (SF) >	X 0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
PACE	MTL/ GLAZED PERSONNEL=	25	AREA (SF) >	X 0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
£ 4-313					TOTAL BASE	LINE	TOTAL BASELINE HEAT LOSSES	н п	0.37 388.28	MBTU / HR MJ/HR

	_	
	S	
	S	
	٩	
	겁	
	$\leq$	
	Δ,	
	<u> </u>	
	丗	
	$\overline{\Box}$	
	冚	
•	E	
	$\overline{\mathbf{z}}$	
	二	
	×	
	0	
-	Z	
	X	
	늗	

# **ECO - 1: INFRARED HEATING CALCULATIONS**

-		٠							PAGE 2 OF	2 OF 3
BUILDING NUMBER:	6118		шОР	UILDING OUTSIDE I TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	E E	E SETPOINT: 55	<u> </u>		
INFILTRATION LOSSES =	<del></del>	AIR CHGS	×	114900	VOL (CUFT) X 5	54 F	F TEMP DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR	FE	ET OF PE	LINEAR FEET OF PERIMETER X 5	54 F	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF)	×	0.105	U VALUE (BTU/ 5 HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF)	×	0.176	U VALUE (BTU/ 5 HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	н	0.00	MBTU/HR
8" CINDER BLOCK WALL =	2936	AREA (SF)	×	0.389		54	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
CORR MTL PNL WALL ≖	1165	AREA (SF)	×	0.17	U VALUE (BTU/ E	54	F TEMPERATURE DIFFERENCE	It	0.01	MBTU / HR
CLR SGL PANE·WINDOWS =	760	AREA (SF)	×	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	Ħ	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0,	AREA (SF)	×	0.65	U VALUE (BTU/ F HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL ROLL UP DOORS =	1344	AREA (SF)	×	0.56	U VALUE (BTU/ PHR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.04	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF)	×	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF)	×	0.56	U VALUE (BTU/ PHR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF)	×	0.56		54	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF)	×	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II .	0.00	MBTU / HR
					TOTAL ECO HEAT LOSSES	HE	T LOSSES	11 11	0.34 355.37	MBTU / HR MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1	BUIL
SYSTEM EFFICIENCY	%09	%06	
OUTSIDE DESIGN TEMP (F)	_	-	1 MBTU
HTG TEMP SETPOINT (F)	09	55	0.019=0
HEATING DEGREE DAYS	4616	3396	.81 = C
TOTAL HEAT LOSSES	70	Č	CORR
(MBTU / HR)	0.3/	J. 54	65 F DE
\$ /MBTU -FUEL OIL	\$6.60	\$6.60	
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
S MRTII .PPG	\$10.84	\$10.84	

BUILDING NUMBER	6118
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLA	81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIR	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

7	ANNUAL HEATIN	TING ENERGY	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY METHO	(00	700
BASELINE =	0.37	MBTU/HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	= 1,151.76	MBTU/YR	
	1,151.76	MBTU/YR X	CORR FACTOR 1	II	1,151.76	MBTU/YR
ECO - 1 =	0.34	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	= 564.90	MBTU/YR	
	564.90	MBTU/YR X	CORR FACTOR 1	11	564.90	MBTU/YR
	ECO - 1	ANNUAL HEATING E	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 11	586.86 619,135.94	MBTU/YR

	ANNOAL	ANNUAL HEATING ENERGY COST	NERG	Y COST			
BASELINE =	1,151.76	MBTU/YR X 6.6	9.9	\$ /MBTU	II	7,601.62 \$ /YR	\$ //R
ECO - 1 =	564.90	MBTU/YR X 4.62	4.62	\$ /MBTU	11	2,609.84 \$ MR	_\$ /YR
	ECO - 1 ANNI	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 4.991.77 \$ /YR	NERGY	COST SAVING	!! CO	4.991.77	<b>₹</b>

# **ECO - 1: INFRARED HEATING CALCULATIONS**

		-						PAGE 1	1 OF 3
BUILDING NUMBER:	6142		BUILDING H OUTSIDE DE FEMPERATU	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60	டடிட		
INFILTRATION LOSSES =	-	AIR CHGS X	138900	VOL (CU FT) X	29	F TEMP DIFF X 0.019	11	0.16	MBTU / HR
FLOOR LOSSES = _	390	LINEAR FE	INEAR FEET OF PERIMETER	IMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
- FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	n	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U. VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	П	0.06	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE		0.00	MBTU·/ HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	ii	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED,PERSONNEL=	20	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR
				TOTAL BASE	LINE L	TOTAL BASELINE HEAT LOSSES	11 11	0.42 443.92	MBTU / HR MJ/HR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

BUILDING NUMBER: 6142   BUILDING HEATING TEMPERATURE   55 F   TemPOINT:								PAG	PAGE 2 OF 3
1 AIR CHGS X 138900 VOL (CU FT) X 54 F TEMP DIFF X 0.019 = 0.14 IN INEAR FEET OF PERIMETER X 54 F TEMP DIFF X 0.019 = 0.02 IN INEAR FEET OF PERIMETER X 54 F TEMPERATURE = 0.00 INFERENCE = 0.00	BUILDING NUMBER:	6142		SUILDING DUTSIDE I FEMPERA	HEATING TEMPERAT DESIGN TEMPERATU TURE DIFFERENCE	URE SETPOINT. RE			
390 LINEAR FEET OF PERIMETER X 54 FTEMP DIFF X 0.81 = 0.02 II U VALUE (BTU) 54 DIFFERENCE = 0.00 II HRSF-F) X 0.389 U VALUE (BTU) 54 DIFFERENCE = 0.00 II HRSF-F) X 0.389 U VALUE (BTU) 54 DIFFERENCE = 0.00 II HRSF-F) X 0.389 U VALUE (BTU) 54 DIFFERENCE = 0.00 II HRSF-F) X 0.17 U VALUE (BTU) 54 DIFFERENCE = 0.00 II HRSF-F) X 0.17 U VALUE (BTU) 54 DIFFERENCE = 0.00 II HRSF-F) X 0.50 HR	INFILTRATION LOSSES =	<del>-</del>		138900	×	F TEMP DIFF X		0.14	MBTU / HR
8100 AREA (SF) X 0.105 UVALUE (BTU) 54 F TEMPERATURE = 0.05 I 0 AREA (SF) X 0.176 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1685 AREA (SF) X 0.389 UVALUE (BTU) 54 F TEMPERATURE = 0.05 I 1685 AREA (SF) X 0.17 UVALUE (BTU) 54 F TEMPERATURE = 0.05 I 1790 AREA (SF) X 0.65 UVALUE (BTU) 54 F TEMPERATURE = 0.05 I 1792 AREA (SF) X 0.65 UVALUE (BTU) 54 F TEMPERATURE = 0.05 I 1792 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.05 I 1794 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.05 I 1795 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1796 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1797 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1797 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1797 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1797 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1797 AREA (SF) X 0.56 UVALUE (BTU) 54 F TEMPERATURE = 0.00 I 1798 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1799 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1797 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1798 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1799 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1799 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1799 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1799 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1799 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 F HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 F HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 F HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 F HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1790 AREA (SF) X 0.56 F HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1700 AREA (SF) X 0.56 F HR-SF-F) X 54 F TEMPERATURE = 0.00 I 1700 AREA (SF) X 0.56 F	FLOOR LOSSES =	390	LINEAR FE		×	F TEMP DIFF		0.02	MBTU / HR
0 AREA (SF) X 0.176 U VALUE (BTU) 54 F TEMPERATURE = 0.00 III F.SF.F) X 0.389 U VALUE (BTU) 54 DIFFERENCE = 0.06 III ERS AREA (SF) X 0.17 U VALUE (BTU) 54 DIFFERENCE = 0.05 III ERS AREA (SF) X 1.235 U VALUE (BTU) 54 DIFFERENCE = 0.05 III ERS AREA (SF) X 1.235 U VALUE (BTU) 54 F TEMPERATURE = 0.05 III ERS ENCE = 0.00 III ENCE ENCE = 0.00 III ENCE ENCE = 0.00 III ERS ENCE = 0.00 III ENCE ENCE ENCE = 0.00 III ENCE ENCE ENCE = 0.00 III ENCE ENCE ENCE ENCE ENCE ENCE ENCE	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF)	0.105	_	ш	RE	0.05	MBTU / HR
2743       AREA (SF)       X       0.389       U VALUE (BTU)       54       F TEMPERATURE       =       0.06         1685       AREA (SF)       X       0.17       U VALUE (BTU)       54       F TEMPERATURE       =       0.02         760       AREA (SF)       X       1.235       U VALUE (BTU)       54       F TEMPERATURE       =       0.05         1792       AREA (SF)       X       0.65       U VALUE (BTU)       54       F TEMPERATURE       =       0.05         0       AREA (SF)       X       0.56       U VALUE (BTU)       54       F TEMPERATURE       =       0.05         0       AREA (SF)       X       0.56       U VALUE (BTU)       54       F TEMPERATURE       =       0.00         0       AREA (SF)       X       0.56       U VALUE (BTU)       54       F TEMPERATURE       =       0.00         50       AREA (SF)       X       0.56       U VALUE (BTU)       54       F TEMPERATURE       =       0.00         50       AREA (SF)       X       0.56       U VALUE (BTU)       54       F TEMPERATURE       =       0.00         50       AREA (SF)       X       0.04       D INFERENCE	FACE BRICK/BLK WALL =	0	(SF)	0.176	(BTU/ F) X	щ	RE	00.00	MBTU / HR
1685 AREA (SF) X 0.17 U VALUE (BTU/) 54 DIFFERENCE  760 AREA (SF) X 1.235 U VALUE (BTU/) 54 DIFFERENCE  0 AREA (SF) X 0.65 U VALUE (BTU/) 54 DIFFERENCE  1792 AREA (SF) X 0.56 U VALUE (BTU/) 54 DIFFERENCE  0 AREA (SF) X 0.214 U VALUE (BTU/) 54 DIFFERENCE  0 AREA (SF) X 0.56 HR - SF - F) X 54 DIFFERENCE  0 AREA (SF) X 0.56 HR - SF - F) X 54 DIFFERENCE  0 AREA (SF) X 0.56 HR - SF - F) X 54 DIFFERENCE  0 AREA (SF) X 0.56 HR - SF - F) X 54 DIFFERENCE  0 AREA (SF) X 0.56 HR - SF - F) X 54 DIFFERENCE  10 VALUE (BTU/) 54 DIFFEREN	8" CINDER BLOCK WALL =	2743	(SF)	0.389	_	щ	RE	90.0	MBTU / HR
760 AREA (SF) X 1.235 U VALUE (BTU/ S4 F TEMPERATURE = 0.05  0 AREA (SF) X 0.65 U VALUE (BTU/ S4 F TEMPERATURE = 0.00  1792 AREA (SF) X 0.56 HR-SF-F) X 54 DIFFERENCE = 0.05  0 AREA (SF) X 0.214 U VALUE (BTU/ S4 F TEMPERATURE = 0.00  0 AREA (SF) X 0.56 HR-SF-F) X 54 DIFFERENCE = 0.00  0 AREA (SF) X 0.56 HR-SF-F) X 54 DIFFERENCE = 0.00  0 AREA (SF) X 0.56 HR-SF-F) X 54 DIFFERENCE = 0.00  1 TEMPERATURE = 0.00  0 AREA (SF) X 0.56 HR-SF-F) X 54 F TEMPERATURE = 0.00  1 TEMPERATURE = 0.00  1 TEMPERATURE = 0.00  1 TEMPERATURE = 0.00  1 VALUE (BTU/ S4 F TEMPERATURE = 0.00  2 HR-SF-F) X 54 DIFFERENCE = 0.00	CORR MTL PNL WALL =	1685	(SF)	0.17	_	ц	RE	0.02	MBTU / HR
0 AREA (SF) X 0.65 U VALUE (BTU/ 54 PIFFERENCE = 0.00 1792 AREA (SF) X 0.56 U VALUE (BTU/ 54 PIFFERENCE = 0.05 0 AREA (SF) X 0.214 U VALUE (BTU/ 54 PIFFERENCE = 0.00 0 AREA (SF) X 0.56 U VALUE (BTU/ 54 PIFFERENCE = 0.00 0 AREA (SF) X 0.56 U VALUE (BTU/ 54 PIFFERENCE = 0.00 0 AREA (SF) X 0.56 U VALUE (BTU/ 54 PIFFERENCE = 0.00 0 AREA (SF) X 0.56 U VALUE (BTU/ 54 PIFFERENCE = 0.00 10 AREA (SF) X 0.56 HR - SF - F) X 54 PIFFERENCE = 0.00	CLR SGL PANE WINDOWS =	160	(SF)	1.235	_	щ	RE	0.05	MBTU / HR
1792 AREA (SF) X 0.56 U VALUE (BTU/ S4 DIFFERENCE = 0.05  0 AREA (SF) X 0.214 U VALUE (BTU/ S4 DIFFERENCE = 0.00  0 AREA (SF) X 0.56 U VALUE (BTU/ S4 DIFFERENCE = 0.00  0 AREA (SF) X 0.56 U VALUE (BTU/ S4 DIFFERENCE = 0.00  10 AREA (SF) X 0.56 U VALUE (BTU/ S4 DIFFERENCE = 0.00  11 AR-SF-F) X S4 DIFFERENCE = 0.00  12 AREA (SF) X 0.615 U VALUE (BTU/ S4 DIFFERENCE = 0.00	TINTED DBL PANE WIN'W`≅	0	(SF)	0.65	•	ĬΤ.	RE	0.00	MBTU/HR
0 AREA (SF) X 0.214 U VALUE (BTU/ 54 PIFFERENCE = 0.00  0 AREA (SF) X 0.56 U VALUE (BTU/ 54 PIEMPERATURE = 0.00  0 AREA (SF) X 0.56 U VALUE (BTU/ 54 PIEMPERATURE = 0.00  50 AREA (SF) X 0.615 U VALUE (BTU/ 54 PIEMPERATURE = 0.00	METAL ROLL UP DOORS ≈	1792	(SF)	0.56	(BTU/ F) X	LL.	RE	0.05	MBTU / HR
0 AREA(SF) X 0.56 U VALUE(BTU/ 54 F TEMPERATURE = 0.00  0 AREA(SF) X 0.56 U VALUE(BTU/ 54 F TEMPERATURE = 0.00  10 AREA(SF) X 0.56 U VALUE(BTU/ 54 DIFFERENCE = 0.00  11 U VALUE(BTU/ 54 DIFFERENCE = 0.00	WOOD GLAZED O'HEAD DR =	0	(SF)	0.214	_	щ	RE	0.00	MBTU / HR
0 AREA(SF) X 0.56 U VALUE(BTU/ 54 F TEMPERATURE = 0.00 50 AREA(SF) X 0.615 U VALUE(BTU/ 54 F TEMPERATURE = 0.00 FOR THE SF - F) X 54 DIFFERENCE = 0.00	LG MTL SLIDING DOOR =	0	(SF)	0.56	_	ш		0.00	MBTU / HR
50 AREA (SF) X 0.615 U VALUE (BTU/ $54$ F TEMPERATURE = 0.00 HR-SF-F) X $54$ DIFFERENCE = 0.00	METAL PERSONNEL DR=	0	SF)	0.56		щ		0.00	MBTU / HR
	MTL/ GLAZED PERSONNEL=	20	(SF)	0.615	_	Щ	RE	0.00	MBTU / HR

MBTU / HR MJ/HR

0.39 406.30

11 11

TOTAL ECO HEAT LOSSES

## **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	_	<b>-</b>
HTG TEMP SETPOINT (F)	09	22
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0.42	0.39
(MBTU / HR)	24.0	5
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MRTU-PPG	\$10.84	\$10.84

<b>BUILDING NUMBER</b>	6142
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SL	81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIR	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FRC	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

	ANNUAL HEATING	TING ENERGY C	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	AY METHO	(ם)	
BASELINE =	0.42	MBTU / HR X 4616 DEGREE DAYS X SYS EFF X 59 TEMP DIFFERENCE	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	= 1,316.82	MBTU/YR	
	1,316.82	MBTU/YR X	CORR FACTOR 1	II	1,316.82	MBTU/YR
ECO - 1 =	0.39	MBTU/HR X 3396 SYS EFF X 54	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X . 54 TEMP DIFFERENCE	= 645.86	MBTU/YR	
	645.86	MBTU/YR X	CORR FACTOR 1	11	645.86	MBTU/YR
	ECO - 1	ANNUAL HEATING EI	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 18	670.96 707,867.19	MBTU/YR

	ANNOAL	<b>ANNUAL HEATING ENERGY COST</b>	NERG	Y COST				
BASELINE =	1,316.82	MBTU/YR X 6.6	9.9	\$ /MBTU	н	8,691.04 \$ /YR	\$ /YR	
ECO - 1=	645.86	MBTU/YR X 4.62	4.62	\$ /MBTU	11	2,983.87 \$ /YR	-\$ /YR	•
	ECO - 1 ANNI	JAL HEATING E	NERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 5,707.17 \$ //R	11	5,707.17	\$ //R	

		T KNO	C LIMI	FT KNOX LIMITED EEAP (GLASS)	9)	LASS)			
	Ш	ECO - 1: INF	FRARED	HEATING CALCULATIONS	LCI	JLATIONS			
BUILDING NUMBER:	6143		BUILDING	BUILDING HEATING TEMPERATURE SETPOINT:	TURE	SETPOINT: 60		PAGE	PAGE 1 OF 3
			TEMPERA	TEMPERATURE DIFFERENCE	2 Î	7 65 F			
INFILTRATION LOSSES =	-	_ AIR CHGS X	138900	VOL (CUFT) X	29	F TEMP DIFF X 0.019	II I	0.16	MBTU / HR
FLOOR LOSSES =	390	LINEAR	R FEET OF PERIMETER	RIMETER X	59	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
FACE BRICK/BLK WALL =		- AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	Ħ	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ił	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	- AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	H	90.0	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
METAL GLAZED O'HEAD DR =		- AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ш	0.00	MBTU / HR
LG MTL SLIDING DOOR =		- AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=		- AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	50	– AREA (SF) X –	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL BASE	INE	TOTAL BASELINE HEAT LOSSES	11 11	0.42 443.92	MBTU / HR MJ/HR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

							PAGE 2	OF 3
BUILDING NUMBER:	6143	<b>B</b> 07	BUILDING DUTSIDE I FEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	JRE SETPOINT: 55 F (E 1 F 54 F			
INFILTRATION LOSSES =	-	AIR CHGS X	138900	VOL (CU FT) X 54	F TEMP DIFF X 0.019 =		0.14	MBTU / HR
FLOOR LOSSES =	390	LINEAR FEET OF		PERIMETER X 54	F TEMP DIFF X 0.81 =		0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ 54 HR-SF-F) X	F TEMPERATURE =		0.05	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	<u> </u>	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	o II	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) · X	1.235	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0 Ii	0.05	MBTU / HR
· TINTED DBL PANE WIN'W =	0	AREA (SF) X	9.65	U VALUE (BTU/ HR-SF-F) X 54	F TEMPERATURE :	0 !!	0.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR-SF-F) X	F TEMPERATURE :	0 ==	0.05	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE :	0	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR-SF-F) X	F TEMPERATURE :	0 =	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE DIFFERENCE	0	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	20	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	F TEMPERATURE : DIFFERENCE	0	0.00	MBTU / HR
				TOTAL ECO HEAT LOSSES		0 4	0.39 406.30	MBTU / HR MJ/HR

**ECO - 1: INFRARED HEATING CALCULATIONS** 

PAGE 3 OF 3

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	_	~
HTG TEMP SETPOINT (F)	09	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0 42	0.30
(MBTU / HR)	70	3
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
COO LITOW &	\$10 84	\$10.84

<b>BUILDING NUMBER</b>	6143
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLA	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIR	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FRO	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

	ANNUAL HEA	TING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	(DEGREE L	JAY I	METHO	((	
HINI	0.42	MBTU / HR X 46	TU / HR X 4616 DEGREE DAYS X 24 HRS/DAY	24 HRS/DAY				
	9.0	SYS EFF X 5	EFF X 59 TEMP DIFFERENCE		11	1,316.82	MBTU/YR	
	1,316.82	MBTU/YR	X CORR FACTOR	<del>~</del> .	11		1,316.82	MBTU/YR
ECO - 1 =	0.39	MBTU / HR X 33	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY	24 HRS/DAY			i i	
•	6.0	SYS EFF X 5	4 TEMP DIFFERENCE		н	645.86	MBIU/YR	
	645.86	MBTU/YR	X CORR FACTOR	~	11	i	645.86	MBTU/YR
	ECO - 1 ANNU	ANNUAL HEATING	JAL HEATING ENERGY CONSUMPTION SAVINGS	ION SAVINGS	11: 11		670.96 707,867.19	MBTU/YR MJ/YR

	ANNOAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST			
BASELINE =	1,316.82	MBTU/YR X 6.6	9.9	\$ /MBTU	11	8,691.04 \$ /YR	\$ /YR
ECO - 1 =	645.86	MBTU/YR X 4.62	4.62	\$ /MBTU	11	2,983.87 \$ /YR	\$ //R
	ECO - 1 ANN	UAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 5,707.17 \$ MR	. H	5,707.17	\$ MR

#### PAGE 1 OF 90.0 0.00 90.0 0.00 0.00 0.16 0.02 0.05 0.00 90.0 0.02 H н H II II H 11 H H 9 29 X 0.019 0.81 TEMPERATURE DIFFERENCE TEMPERATURE TEMPERATURE DIFFERENCE TEMPERATURE **TEMPERATURE TEMPERATURE** TEMPERATURE DIFFERENCE TEMPERATURE TEMPERATURE **TEMPERATURE** DIFFERENCE DIFFERENCE DIFFERENCE DIFFERENCE DIFFERENCE DIFFERENCE × **ECO - 1: INFRARED HEATING CALCULATIONS** 59 F TEMP DIFF F TEMP DIFF FT KNOX LIMITED EEAP (GLASS) **BUILDING HEATING TEMPERATURE SETPOINT:** u. u. عا ட **OUTSIDE DESIGN TEMPERATURE** 59 59 59 59 59 29 59 TEMPERATURE DIFFERENCE VOL (CUFT) X U VALUE (BTU/ HR - SF - F) X U VALUE (BTU/ HR - SF - F) X U VALUE (BTU/ HR - SF - F) X U VALUE (BTU/ HR - SF - F) X U VALUE (BTU/ HR - SF - F) X U VALUE (BTU/ HR - SF - F) X U VALUE (BTU/ J VALUE (BTU/ U VALUE (BTU/ U VALUE (BTU/ HR - SF - F) X HR - SF - F) X HR-SF-F) X HR - SF - F) X × LINEAR FEET OF PERIMETER AIR CHGS X 138900 0.214 0.105 0.176 0.389 1.235 0.65 0.56 0.56 0.17 × × × × × × × × AREA (SF) 6144 8100 2743 1685 1792 390 760 П H 8" CINDER BLOCK WALL = TINTED DBL PANE WIN'W = LG MTL SLIDING DOOR = FLOOR LOSSES INFILTRATION LOSSES FACE BRICK/BLK WALL CORR MTL PNL WALL CLR SGL PANE WINDOWS METAL ROLL UP DOORS METAL GLAZED O'HEAD DR FLAT BUILT UP ROOF SURFACE HEAT LOSSES **BUILDING NUMBER:**

MBTU / HR

MBTU / HR

က

MBTU / HR

0.00

H

DIFFERENCE

59

MBTU / HR

0.00

11

59

U VALÛE (BTU/ HR-SF-F) X

0.615

×

AREA (SF)

20

MTL/ GLAZED PERSONNEL=

METAL PERSONNEL DR=

0.56

×

AREA (SF)

MBTU / HR

0.42 443.92

11 11

**TOTAL BASELINE HEAT LOSSES** 

	_	_
Č	ſ	)
Č	ï	Ś
_	ł	ŕ
	٦	ì
7	ī	;
•	_	ر
L	1	2
•	1	Ĺ
L	Į.	Į
L	L	J
•	-	•
L		i
L	_	2
Ξ		
	>	5
Ξ		7
-	-	ł
>	×	(
		)
-	7	•
-	7	,
.=	•	•
ŀ	-	-
Ĺ	l	-

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

			777	I HALLED TEXTED OXECOLATIONS	ָ כ				
		-				•		PAGE	2 OF 3
BUILDING NUMBER:	6144		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUF TURE	RE SETPOINT: 55			
INFILTRATION LOSSES =	-	AIR CHGS X	138900	VOL (CUFT) X 54 F TEMP DIFF	54 F	TEMP DIFF X 0.019	u u	0.14	MBTU / HR
FLOOR LOSSES =	390	LINEAR F	EET OF P	LINEAR FEET OF PERIMETER X	54 F	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	. 54	F TEMPERATURE DIFFERENCE	п	0.05	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389		54	F TEMPERATURE DIFFERENCE	• 18	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	24	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	н	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF). X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	ŧı	0.05	MBTU/HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II ·	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	• 11	0.00	MBTU/HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	П	0.00	MBTU/HR
MTU GLAZED PERSONNEL=	20	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL ECO HEAT LOSSES	HEA	TLOSSES	11 11	0.39 406.30	MBTU / HR MJ/HR

**ECO - 1: INFRARED HEATING CALCULATIONS** 

PAGE 3 OF 3

BASELINE

ECO - 1	BUILDING NUMBER 6144
%06	GLOSSARY OF TERMS
τ-	1 MBTU = 1055 MJ
55	0.019=CONSTANT
3396	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65.0 -	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2
\$6.60	
\$4.62	

4616 0.42

OUTSIDE DESIGN TEMP (F)
HTG TEMP SETPOINT (F)
HEATING DEGREE DAYS
TOTAL HEAT LOSSES
(MBTU / HR)
\$ /MBTU -FUEL OIL
\$ /MBTU -NATURAL GAS
\$ /MBTU -NATURAL GAS

90

SYSTEM EFFICIENCY

\$10.84 \$6.60 \$4.62

	ANNUAL HEATING	TING ENERGY (	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	NAY METHO	<u>(</u>	
BASELINE =	0.42	MBTU / HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	= 1,316.82	MBTU/YR	***************************************
	1,316.82	MBTU/YR X	CORR FACTOR 1	11	1,316.82	MBTU/YR
. ECO - 1=	0.39	MBTU / HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	= 645.86	. MBTU/YR	
	645.86	MBTU/YR X	CORR FACTOR 1	11	645.86	MBTU/YR
	ECO - 1	ANNUAL HEATING E	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 11	670.96 707,867.19	MBTU/YR MJ/YR

	ANNOAL	<b>ANNUAL HEATING ENERGY COST</b>	NERG	Y COST			
BASELINE =	1,316.82	MBTU/YR X 6.6	9.9	\$ /MBTU	II	8,691.04 \$ /YR	\$ //R
ECO - 1 =	645.86	MBTU/YR X 4.62	4.62	\$ /MBTU	11	2,983.87 \$ MR	\$ /YR
	ECO 4 ANIM	ECO_1 ANNIJAL HEATING ENERGY COST SAVINGS = 5.707.17 \$ /YR	:NFRGY	COST SAVINGS	11	5.707.17	<b>\$</b>

\UU\ -		
Ć		)
2	_	
L	Į	ì
L	L	j
	L	֡֝֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜
	>	
>	<b>*</b>	\ )
1	<	
L	L	=

# ECO - 1: INFRARED HEATING CALCULATIONS

BUILDING NUMBER:	6145		BUILDING H OUTSIDE DI TEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60	<u></u>		
INFILTRATION LOSSES =	-	AIR CHGS X	138900	VOL (CUFT) X	59 F	F TEMP DIFF X 0.019	11	0.16	MBTU / HR
FLOOR LOSSES =	390	LINEAR FE	LINEAR FEET OF PERIMETER	RIMETER X	59 F	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	H	0.05	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	. 69	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
TINTED DBL PANE WIN'W =	•	AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	. 69	F TEMPERATURE DIFFERENCE	11	00.00	MBTÜ / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	П	90.0	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
LG MTL SLIDING DOOR =		– AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	50	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	. 69	F TEMPERATURE DIFFERENCE	п	0.00	MBTU / HR

MBTU / HR MJ/HR

0.42 443.92

11 11

TOTAL BASELINE HEAT LOSSES

(GLASS)	
D EEAP	
LIMITE	
T KNOX	
丘	

'n
¥
$\stackrel{\checkmark}{=}$
$\underline{\mathbf{c}}$
ᆮ
ď
$\Box$
$\overline{}$
5
<b>~</b>
۲
$\sim$
U
(1)
ž
=
⋖
Ш
I
$\overline{}$
山
R
_
5
K
E N
$\leq$
~
$\bigcirc$
X
ECC
ш

BUILDING NUMBER:	1777		L			į		L		
	6145		1 O F	SUILDING SUTSIDE [ TEMPERA]	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	atuf Iure :	RE SETPOINT: 55 F	к кік		
INFILTRATION LOSSES =	<del></del>	AIR CHGS	×	138900	VOL (CU FT) X	54 F	F TEMP DIFF X 0.019	II .	0.14	MBTU / HR
FLOOR LOSSES =	390	LINEAR	Y FEI	LINEAR FEET OF PERIMETER	RIMETER X	54 F	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF)	×	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF)	×	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF)	×	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF)	×	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF)	×	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	. 11	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF)	×	0.65	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCË	Ш	0.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF)	×	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	00.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	20	AREA (SF)	×	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	00.00	MBTU / HR

MBTU / HR MJ/HR

H H

TOTAL ECO HEAT LOSSES

**ECO - 1: INFRARED HEATING CALCULATIONS** 

PAGE 3 OF 3

			_						
ECO - 1	%06	~	22	3396	0.39		\$6.60	\$4.62	\$10.84
BASELINE	%09	Ψ-	09	4616	0.42		\$6.60	\$4.62	\$10.84
	SYSTEM EFFICIENCY	OUTSIDE DESIGN TEMP (F)	HTG TEMP SETPOINT (F)	HEATING DEGREE DAYS	TOTAL HEAT LOSSES	(MBIO/HK)	\$ /MBTU -FUEL OIL	\$ /MBTU -NATURAL GAS	A /MRTII -PPG

	ANNUAL HEA	TING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY METI	10D)	
BASELINE =	0.42	MBTU / HR X 4616	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY	1 316 82	2 MBTU/YR	
	9.0	SYS EFF X 59				
	1,316.82	MBTU/YR X	CORR FACTOR 1	n	1,316.82	MBTU/YR
ECO - 1 =	0.39	MBTU / HR X 3396	FU / HR X 3396 DEGREE DAYS X 24 HRS/DAY			
•	6.0	SYS EFF X 54	SYS EFF X 54 TEMP DIFFERENCE	= 645.86	MBIU/TR	•
	645.86	MBTU/YR X	CORR FACTOR 1	II	645.86	MBTU/YR
	ECO - 1 ANNU	ANNUAL HEATING E	IAL HEATING ENERGY CONSUMPTION SAVINGS	11 11	670.96 707,867.19	MBTU/YR MJ/YR

	ANNOAL	<b>ANNUAL HEATING ENERGY COST</b>	NERG	Y COST			
BASELINE =	1,316.82	MBTU/YR X 6.6	6.6	\$ /MBTU		8,691.04 \$ /YR	\$ /YR
ECO - 1 ≡	645.86	MBTU/YR X 4.62	4.62	\$ /MBTU	11	= 2,983.87 \$ MR	- <b>\$</b> /YR
	FCO - 1 ANNI	JAL HEATING E	NERGY	FCO - 1 ANNIJAL HEATING ENERGY COST SAVINGS = 5,707.17 \$ /YR	li	5,707.17	\$ /YR

## **ECO - 1: INFRARED HEATING CALCULATIONS**

							PAGE 1 OF	1 OF 3
BUILDING NUMBER:	6146	BUILDI OUTSII TEMPE	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE URE	SETPOINT: 60	<u> </u>		
INFILTRATION LOSSES =	-	AIR CHGS X 138900	VOL (CU FT) X	59	F TEMP DIFF X 0.019	11	0.16	MBTU / HR
FLOOR LOSSES =	390	LINEAR FEET OF PERIMETER	PERIMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X 0.105	5 U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X 0.176	6 U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X 0.389	9 U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	н	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X 0.17	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X 1.235	5 U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
. TINTED DBL PANE WIN'W =		AREA (SF) X · 0.65	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE . DIFFERENCE	ŧI	00.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X 0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	н	90.0	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X 0.214	4 U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X 0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	u	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X 0.56	6 U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	20	AREA (SF) X 0.615	5 U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCÉ	ti	0.00	MBTU / HR

MBTU / HR MJ/HR

0.42 443.92

TOTAL BASELINE HEAT LOSSES

	V V	
	[U	)
	0	_
	<u>Ш</u> Ц	
•		ׅׅ֝֝֝֝֝֝֜֜֜֝֝֜֜֜֜֝֝֜֜֜֝֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜
	LIN	
	=	į
	<u>X</u>	<b>(</b> )
	X	
	L	-

## **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAGE 2	2 OF 3
BUILDING NUMBER:	6146	<b>M</b> OF,	UILDING UTSIDE I EMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATU IURE	RE SETPOINT: 55	ши <mark>,</mark> ш		
INFILTRATION LOSSES =	<del>-</del>	AIR CHGS X	138900	VOL (CU FT) X	54	F TEMP DIFF X 0.019	11	0.14	MBTU/HR
FLOOR LOSSES =	390	LINEAR FEET OF	ET OF PE	PERIMETER X	54	F TEMP DIFF X 0.81	II I	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	Ħ	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	П	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
TINTED DBL PANE WHI'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0:00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	20	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL ECO HEAT LOSSES	HE/	AT LOSSES	11 11	0.39 406.30	MBTU / HR MJ/HR

**ECO - 1: INFRARED HEATING CALCULATIONS** 

PAGE 3 OF 3

	BASELINE	ECO - 1	
SYSTEM EFFICIENCY	%09	%06	
OUTSIDE DESIGN TEMP (F)	<del></del>	<del></del>	
HTG TEMP SETPOINT (F)	09	55	
HEATING DEGREE DAYS	4616	3396	
TOTAL HEAT LOSSES	0.42	0.39	
(MBTU / HR)	N F. O	5	
\$ /MBTU -FUEL OIL	\$6.60	\$6.60	
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62	
COO LITORN &	£10.84	\$10 8 <b>4</b>	-

6146	GLOSSARY OF TERMS	1 MBTU = 1055 MJ 0.019=CONSTANT .81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS 65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2	
<b>BUILDING NUMBER</b>		1 MBTU = 1055 MJ 0.019=CONSTANT .81 = CONSTANT FOR SL CORR FACTOR = EMPII 65 F DEGREE-DAYS FRC	

	ANNUAL HEA	ATING ENERGY C	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY METHO	)D)	
BASELINE =	0.42	MBTU/HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	= 1,316.82	MBTU/YR	
	1,316.82	MBTU/YR X	CORR FACTOR 1	II .	1,316.82	MBTU/YR
ECO - 1 =	0.39	MBTU/HR X 3396 DEGREE DAYS X SYS EFF X 54 TEMP DIFFERENCE	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE .	= 645.86	MBTU/YR	
	645.86	MBTU/YR X	CORR FACTOR 1	11	645.86	MBTU/YR
	ECO - 1	ANNUAL HEATING E	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 11	670.96 707,867.19	MBTU/YR MJ/YR

	ANNOAL	ANNUAL HEATING ENERGY COST	שואפ	1 000 1			
BASELINE =	1,316.82	MBTU/YR X 6.6	9.9	\$ /MBTU	11	8,691.04 \$ /YR	\$ MR
ECO - 1 =	645.86	MBTU/YR X 4.62	4.62	\$ /MBTU	II	2,983.87 \$ /YR	_\$ /YR
	ECO - 1 ANNI	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS = 5,707.17 \$ //R	ENERGY	COST SAVINGS	11	5,707.17	\$ MR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

			٠					PAGE 1	1 OF 3
BUILDING NUMBER:	6147		BUILDING H OUTSIDE DI TEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATURI 'URE	60	<u></u>		
INFILTRATION LOSSES =		AIR CHGS X	138900	VOL (CU FT) X	29	F TEMP DIFF X 0.019	11	0.16	MBTU / HR
FLOOR LOSSES =	390	LINEAR FE	EAR FEET OF PERIMETER	IMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
FACE BRICK/BLK WALL =		_ AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	ŧI	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	90.0	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	. 00.0	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	П	00.00	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	00.00	MBTU / HR
METAL PERSONNEL DR=	,	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	00.00	MBTU / HR
MTL/ GLÁZED PERSONNEL=	20	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	ti	00.00	MBTU / HR
		•					1		

MBTU / HR MJ/HR

0.42 443.92

R H

**TOTAL BASELINE HEAT LOSSES** 

S
Ś
4
<u>5</u>
<u>ت</u>
Ш Ш
Ш
Ω
쁘
=
$\leq$
ô
Ž
Y
H
helian

## **ECO - 1: INFRARED HEATING CALCULATIONS**

				_			-	PAGE	PAGE 2 OF 3
BUILDING NUMBER:	6147		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUR TURE	E SETPOINT: 55	) 		
INFILTRATION LOSSES =	-	AIR CHGS X	138900	VOL (CUFT) X	54 F	F TEMP DIFF X 0.019	11	0.14	MBTU / HR
FLOOR LOSSES =	390	LINEAR FEET OF		PERIMETER X	54 F	F TEMP DIFF X 0.81	1	0.02	MBTU!HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	п	0.05	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	094.	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
TINTED DBL PANE W#N'W =	0	· AREA (SF) X	0.65	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
LG MTL SLIDING DOOR ≈	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	П	00.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	90	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
				TOTAL ECO HEAT LOSSES	НЕА	TLOSSES	11 11	0.39 406.30	MBTU / HR MJ/HR

#### **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

BASELINE
%09
_
9
4616
(
0.42
\$6.60
\$4.62
\$10.84

BUILDING NUMBER	3ER 6147	
	GLOSSARY OF TERMS	
1 MBTU = 1055 MJ		T
0.019=CONSTANT		
81 = CONSTANT FC	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	
CORR FACTOR =	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	(f)
65 F DEGREE-DAYS	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2	)

1	ANNUAL HEA	TING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	V (DEGREE	DAY	METHO	()	
BASELINE =	0.42	MBTU/HR X 46 SYS EFF X 5	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	24 HRS/DAY	11	1,316.82	MBTU/YR	
	1,316.82	MBTU/YR	X CORR FACTOR	<b>-</b>	Ш		1,316.82	MBTU/YR
ECO - 1 =	0.39	MBTU/HR X 33 SYS EFF, X 5	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF, X 54 TEMP DIFFERENCE	24 HRS/DAY	п	645.86	MBTU/YR	
	645.86	MBTU/YR	X CORR FACTOR	_	II	ŧ	645.86	MBTUMR
	ECO - 1 ANNU	ANNUAL HEATING	AL HEATING ENERGY CONSUMPTION SAVINGS	TION SAVINGS	11 11		670.96	MBTU/YR M.I/YR

111677.00	ANNOAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST				
BASELINE =	1,316.82	MBTU/YR X 6.6	9.9	\$ /MBTU	H	8,691.04 \$ MR	\$ /YR	
ECO - 1 =	645.86	MBTU/YR X 4.62	4.62	\$ /MBTU	II	2,983.87 \$ /YR	\$ MR	
	ECO - 1 ANNI	JAL HEATING E	NERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS	11	5,707.17 \$ /YR	\$ /YR	

STUDY; 6560ECO1 LCCID 1.080 LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) INSTALLATION & LOCATION: FORT KNOX REGION NOS. 4 CENSUS: 3 PROJECT NO. & TITLE: 6560ECO1 ECO-1 INFRARED HEAT FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED ANALYSIS DATE: 10-18-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH 1. INVESTMENT A. CONSTRUCTION COST \$
B. SIOH \$
C. DESIGN COST \$
D. TOTAL COST (1A+1B+1C) \$ 239399. 11970. 11970. 263339. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0. F. PUBLIC UTILITY COMPANY REBATE G. TOTAL INVESTMENT (1D - 1E - 1F) 263339. 2 ENERGY SAVINGS (+) / COST (-) DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1993 UNIT COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5) FUEL .00 0. 6569. 15.61 0. 0. A. ELECT \$ B. DIST \$ 6.60 43357. 17.56 761356. 0. C. RESID \$ .00 0. 19.97 0. D. NAT G \$ 4.62 -3222. -14886. 20.96 -312006. 0. E. COAL \$ .00 F. LPG \$ .00 0. 17.58 • 0. 0. 0. 16.12 0. 0. 0. 14.74 M. DEMAND SAVINGS 3347. \$\displaystyle{\frac{1}{5}}\$ 28472. 449350. N. TOTAL 3. NON ENERGY SAVINGS(+) / COST(-) 2970. A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 14.74 (2) DISCOUNTED SAVING/COST (3A X 3A1) 43778. B. NON RECURRING SAVINGS (+) / COSTS (-) DISCOUNTED SAVINGS(+)/ YR DISCNT SAVINGS(+) 7INGS (+) IR DISCNI COST (-) OC FACTR (1) (2) (3) 19073. 5 .86 19073. 15 .63 2727. 7 .81 COST(-) ITEM COST(-)(4) 16402. 1. REPAIR 15 7 14 3 2. REPAIR2 12016. 2209. 3. REPAIR3 2727. 2727. 54738. .65 .91 1773. 4. REPAIR4 58912. 5. ENVIR 64738. \$ 108338. 91312. d. TOTAL C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 135089. 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 36858. 7.14 YEARS 5. SIMPLE PAYBACK PERIOD (1G/4) \$ 584439. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) 7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) =2.22 (IF < 1 PROJECT DOES NOT QUALIFY) 7.29 % 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

<pre>Estimate: Description: Project: Location:</pre>	65XX AREA COST ESTI LIMITED E	MATE	id Date:	94013 02		
Sq. footage:	MAIN GAS	LINE C	ity indx:L	ouisville,	KY =======	========
•	Descripti				•	
	Manhours	Matl	Labor E	quipment	Sub	Total
				•		
0205542200	24"THICK	LITION, PAV	D		111.00	
Unit values Totals	4.21 $467.42$	0.00 \$0	92.52 \$10,270	133.64 \$14,834	0.00 \$0	226.16 \$25,104
0222541900	TAMPING T	RENCH B'FI			111.00	C.Y.
Unit values Totals	0.09 9.88	0.00 \$0	1.74 \$193	0.67 \$74	0.00 \$0	2.41 \$267
0222582800		CVTNG 40HP			1500 00	L.F.
Unit values Totals	0.01 15.00	0.00 \$0	0.24 \$355	0.24 \$355	0.00 \$0	0.47 \$710
0251200400	CONCRETE CONCRETE,	PAVING, JO 12" THICK	INTS/FINIS	H, 4500 PS 1.02	I 167.00	
Unit values Totals	0.05 8.18	17.52 \$2,926	1.07 \$179	1.02 \$170	0.00 \$0	19.61 \$3,275
	BANK	FOR PIPE I			28.00	C.Y.
Unit values Totals	0.16 4.48	2.43 \$68	3.37 \$94	1.37 · \$38	0.00 \$0	7.17 \$200
0260120500	BEDDING,	PLACING IN	TRENCH		28.00	C V
Unit values Totals	0.09 2.49		1.74 \$49		0.00	2.41
0266907800	CUT IN VA	LVES, W/DU	CK TIP GAS	KET, 4" DI.	AMETER 1.00	Po.
Unit values Totals	1.56 1.56		35.47 \$35		0.00	300.98 \$301
0268520200		CE & DISTR		POLYETHYLE	NE,60- 1500.00	т. г
Unit values Totals	0.07	0.75	1.48 \$2,220		0.00	2.23 \$3,349

Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
U02 'SITEWORK	610	\$4,383	\$13,395	\$15,496	\$0	\$33,274
1562600139	GAS APPLIA	NCE REGUI PE SIZE	LATORS DO	UBLE DIAPHRA	AGM 1.00	Ea.
Unit values Totals	0.73 0.73	420.00 \$420	16.42 \$16	0.00 · \$0	0.00 \$0	436.42 \$436
U15 MECHANICAL	1	\$420	\$16	\$0	\$0	\$436

Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
===========		=====				=======
ESTIMATE TOTAL	611	\$4,803	\$13,411	\$15,496	\$0	\$33,710
SALES TAX MATL MARKUP LABOR MARKUP EOUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
SUB MARKUP	0.00%			Ψ.	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$4,803	\$13,411	\$15,496	\$0 •	\$33,710 \$3,371 \$0 \$3,371
JOB TOTAL						\$40,452

Estimate: 65XX AREA

Date: 14-Oct-94

Description:

COST ESTIMATE LIMITED EEAP(GLASSBID Date:

Project:
Location:

Location: FORT KNOX, KY Job #: 94013.02 Sq. footage: MAIN GAS LINE City indx:Louisville, KY

.

•	SUMMARY					
·	Manhours	Matl	Labor	Equipment	Sub	Total
	:=======					
U02 SITEWORK U15 MECHANICAL	610 1	\$4,383 \$420	\$13,395 \$16	\$15,496 \$0	\$0 \$0	\$33,274 \$436
TOTAL	611	\$4,803	\$13,411	\$15,496	\$0	\$33,710
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		Ψ°	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	CONTINGENC 10.00% 0.00% 10.00%	\$4,803	\$13,411	\$15,496	\$0	\$33,710 \$3,371 \$0 \$3,371
JOB TOTAL						\$40,452

\_\_\_\_\_ BLDG 6560 Date: 14-Oct-94 COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: 4800.00 \_\_\_\_\_\_ Description Line # Equipment Matl Labor Manhours \_\_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 400.00 L.F. 4"DIAMETER 0.00 4.44 1.29 Unit values 0.15 0.00 3.16 \$0 60.00 \$0 \$1,262 \$514 \$1,776 Totals 0207183600 HVAC DEMO, MECH EOPT HEAVY ITEM 0.50 Ton 0.00 0.00 0.00 380.36 380.36 Unit values 14.55 \$0 \$190 \$0 \$0 \$190 7.27 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. 0.24 0.00 2.21 Unit values 0.07 0.00 1.97 \$395 \$0 \$47 \$0 \$442 Totals 14.20 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 100.00 Ea. DIAMETER PIPE 0.00 5.55 0.68 0.00 6.23 0.20 Unit values \$0 \$555 \$68 \$0 \$623 20.00 Totals 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. 300.98 5.91 Unit values 1.56 259.60 35.47 0.00 \$6 \$301 Totals 1.56 \$260 \$35 \$0 0268520550 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN END, TAR COAT&WRAP 1"DIAM 50.00 L.F. Unit values 0.11 1.92 2.96 0.17 0.00 5.06 \$9 \$0 Totals 5.35 \$96 \$148 \$253 \$0 \$3,585 U02 SITEWORK 109 \$356 \$2,585 \$644

		=======		========		========
Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
					·	
1554510245	HTG INFA-RD	UNT GAS	ELEC IGN	I (See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		18822.00 \$18,822
1562600137	GAS APPLIAN TYPE 1-1/4"			BLE DIAPHE	RAGM 1.00	Fa
Unit values Totals		226.00 \$226	12.10 \$12	0.00	0.00	
U15 MECHANICAL	1	\$226	\$12	\$0	\$18,822	\$19,060

	=========	========	=======	========	=======================================	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=========	========	=======	=======	========	=======:	*****
ESTIMATE TOTAL	110	\$582	\$2,597	\$644	\$18,822	\$22,645
SALES TAX MATL MARKUP	0.00%	\$0 \$0	άo			
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0	
	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$18,822	\$22,645 \$2,265 \$0 \$2,265
JOB TOTAL						\$27,174

\_\_\_\_\_\_

Estimate: BLDG 6560
Description: COST ESTIMATE

Date: 14-Oct-94

Project: LIMITED EEAP (GLASSBid Date:
LOCATION: FORT KNOX KY Job #:

94013.02

Location: Sq. footage: 4800.00

FORT KNOX, KY Job #:

City indx:Louisville, KY

•	st	JMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
==========		= = = = = = = = = = = = = = = = = = = =	=======	3 <b>2 2 2 2 2 2 2 2 2</b> 2 2 2 2 2 2 2 2 2 2	=======	=======
U02 SITEWORK U15 MECHANICAL	109 1	\$356 \$226	\$2,585 \$12	\$644 \$0	\$0 \$18,822	\$3,585 \$19,060
TOTAL	110	\$582	\$2,597	\$644	\$18,822	\$22,645
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$18,822	\$22,645 \$2,265 \$0 \$2,265
JOB TOTAL						\$27,174

Estimate: BLDG 6560 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Description Line # Equipment Labor Matl Manhours \_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 300.00 L.F. AND RECEPTACLES 6.79 2.22 4.57 0.00 0.00 0.15 Unit values \$0 \$0 \$2,037 44.70 \$665 \$1,372 Totals CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 50.00 L.F. 2.22 0.00 0.00 6.79 Unit values 0.15 4.57 \$0 \$0 \$340 Totals 7.45 \$111 \$229 \$0 \$2,377 A09 ELECTRICAL \$776 \$1,601 \$0 53

Line #	Descripti	on				
	Manhours			Equipment	Sub	Total
==============	======	========	======			========
1517010650	W/CDI.CC			CHEDULE 40,	275.00	L.F.
Unit values Totals	0.44	4.17 \$1,147	10.30 \$2,833	0.00 \$0	0.00 \$0	
1517011310	GAS SERVI	10/00 1/01	T T 7 N/		220 00	& HNGR SZD L.F.
Unit values Totals	0.13 41.91	1.64 \$541	2.88 \$949	0.00 \$0	0.00 \$0	
1519010320	ALUMINUM	REFLECTORS	W/HANGE	RS	38.00	₽a
Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145	0.00 \$0	0.00	
1524105040	VACUUM PU	MP AND VEN	T PIPING		1.00	₽ <sub>a</sub>
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00 \$0	0.00	858.50
1552301020	CRV-100 G	AS FIRED B	URNER, 1	00 MBH & CO	MBUSTION 6.00	CHAMBER
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	904.06
1554510220	CO-RAY-VA	C VANTAGE	2 INFA-R	D HTG UNIT,	GAS 40 M 2.00	BH Fa
Unit values Totals	4.00	935.00 \$1,870	81.70 \$163	0.00 \$0	0.00	1016.70
1556800120	CO-RAY-VA	C VANTAGE	2 VENT P	IPE.	2 00	Ea.
Unit values Totals	1.60 3.20	70.00 \$140	76.50 \$153			146.50
1574205220	ELECTRIC	THERMOSTAT	W/ COVE	R AND WIRING	3 00	To.
Unit values Totals	1.00	75.00 \$225	27.55 \$83		3.00 0.00 \$0	102.55
U15 MECHANICAL	207	\$11,333	\$4,710	\$0	\$0	\$16,043

/============	=======	=======				=========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	=======	========	=======	=======
1631200100	HEATING S	YSTEM POWE	ER / CONT	ROL PANEL		
				•	1.00	Ea.
Unit values	2.96	330.76	70.58	0.00	0.00	401.34
Totals	2.96	\$331	\$71	\$0	\$0	\$402
		4225	45.	40		***
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======	=======		
• ESTIMATE TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0,	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	\$0	\$0	\$18,822 \$0 \$0 \$0
JOB TOTAL						\$18,822

Estimate: BLDG 6560 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP (GLASSBID Date:

FORT KNOX, KY Job #: 94013.02

Location:

Sq. footage:		.,	City indx	:Louisville,	KY	
=======================================	======== S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=========			======	=======================================		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	207	\$776 \$11,333 \$331	\$1,601 \$4,710 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$16,043 \$402
TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	<b>.</b> \$0	
	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	. \$0	\$0	\$18,822 \$0 \$0 \$0
JOB TOTAL						\$18,822

\_\_\_\_\_\_\_ Date: 14-Oct-94 BLDG 6561 Estimate: COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY 4800.00 Sq. footage: Description Line # Equipment Labor Manhours Matl SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 400.00 L.F. 4"DIAMETER 0.00 3.16 1.29 0.00 0.15 Unit values \$0 \$514 \$1,776 60.00 \$0 \$1,262 Totals HVAC DEMO, BOILER GAS/OIL STL >150MBH 0207180380 1.00 Ea. 0.00 323.82 0.00 323.82 0.00 Unit values 12.00 \$0 \$324 \$0 \$0 \$324 12.00 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.50 Ton 0.00 0.00 380.36 380.36 0.00 Unit values 14.55 \$0 \$190 \$0 \$190 7.27 \$0 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. 2.21 1.97 0.24 0.00 0.00 Unit values 0.07 \$0 \$442 \$395 \$47 . \$0 Totals 14.20 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 100.00 Ea. DIAMETER PIPE 0.00 6.23 0.68 0.20 0.00 5.55 Unit values \$0 \$623 \$555 \$68 Totals 20.00 \$0 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 259.60 35.47 5.91 0.00 300.98 1.56 Unit values \$260 \$35 \$6 \$0 \$301 1.56 Totals GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 50.00 L.F. END, TAR COAT&WRAP 1"DIAM 2.96 0.00 5.06 0.17 Unit values 0.11 1.92 \$0 \$253 \$9 \$96 \$148 Totals 5.35 \$644 \$0 \$3,909 \$2,909 121 \$356 U02 SITEWORK

=======================================	========	========			========	========
Line #	Descriptio	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	N (See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		18822.00
1562600137	GAS APPLIA			JBLE DIAPHR		<b>D</b> -
Unit values Totals	TYPE 1-1/4 0.53 0.53		12.10 \$12	0.00 \$0	1.00 0.00 \$0	238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$18.822	\$19,060

Line #	Description	on	,			
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======	======				
ESTIMATE TOTAL	122	\$582	\$2,921	\$644	\$18,822	\$22,969
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,921	\$644	\$18,822	\$22,969 \$2,297 \$0 \$2,297
JOB TOTAL						\$27,563

Estimate: BLDG 6561 Date: 14-Oct-94

Description: COST ESTIMATE

Project: LIMITED EEAP(GLASSBid Date:
Location: FORT KNOX, KY Job #: 94013.02

Sq. footage: 4800.00 City indx:Louisville, KY

	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======	:======:	======	========	======
U02 SITEWORK U15 MECHANICAL	121 1	\$356 \$226	\$2,909 \$12	\$644 \$0	\$0 \$18,822	\$3,909 \$19,060
TOTAL	122	\$582	\$2,921	\$644	\$18,822	\$22,969
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,921	\$644	\$18,822	\$22,969 \$2,297 \$0 \$2,297
JOB TOTAL						\$27,563

A09 ELECTRICAL

53

\_\_\_\_\_\_ BLDG 6561 Date: 14-Oct-94 Estimate: INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_ Labor Equipment Manhours Matl 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 300.00 L.F. 6.79 2.22 4.57 0.00 0.00 Unit values 0.15 \$0 Totals 44.70 \$665 \$1,372 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 50.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 \$0 \$0 Totals 7.45 \$111 \$229 \$340

\$776 \$1,601

\$0

\$0

\$2,377

Line #	Descripti	on					
	Manhours	Matl			ent	Sub	Total
=======================================	=======	=======	======		=====		
1517010650	WICDICS	EL RADIANT	•				, 4" DIAM L.F.
Unit values Totals	0.44	4.17 \$1,147	10.30 \$2,833	0.3	.00 \$0	0.00 \$0	14.47 \$3,980
1517011310		10/00 1/2"	MATC			W/CPLG 8	MINGR SZD L.F.
Unit values Totals	0.13 41.91	1.64 \$541	2.88	3 0.	.00 \$0	0.00 \$0	4.52 \$1,490
1519010320	ALUMINUM	REFLECTORS	W/HANG	ERS			
Unit values Totals		39.79 \$1,512			.00 \$0		Ea. 43.59 \$1,657
1524105040	VACUUM PU	MP AND VEN	r pipino	3			_
Unit values Totals		738.35 \$738		5 0.			Ea. 858.50 \$858
1552301020	CRV-100 G	AS FIRED BU	JRNER, I	LOO MBH	& CON		
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	5 O.	.00 \$0		904.06 \$5,424
1554510220	CO-RAY-VA	C VANTAGE 2	2 INFA-F	RD HTG UN	NIT, G		
Unit values Totals		935.00 \$1,870			.00 \$0	2.00 0.00 \$0	
1556800120	CO-RAY-VA	C VANTAGE 2	2 VENT E	PIPE			_
Unit values Totals		70.00 \$140			.00 \$0		Ea. 146.50 \$293
1574205220	ELECTRIC	THERMOSTAT	W/ COVE	ER AND WI	RING		
Unit values Totals	1.00	75.00 \$225	27.55 \$83		00 \$0	3.00 0.00 \$0	Ea. 102.55 \$308
U15 MECHANICAL	207	\$11,333	\$4,710	)	\$0	\$0	\$16,043

Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
===============	=======	=======	======			
1631200100	HEATING S	YSTEM POWI	ER / CONT	ROL PANEL	1 00	7-
Unit values	2.96	330.76	70.58		1.00 0.00	401.34
Totals	2.96	\$331	\$71	. \$0	\$0	\$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

===========	=======	=======	=======		========	=======		
Line #	Description							
	Manhours	Matl	Labor	Equipment	Sub	Total		
=======================================	========	=======	======:	=======				
ESTIMATE TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822		
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0						
LABOR MARKUP	0.00%	4.	\$0					
EQUIPT MARKUP	0.00%		·	\$0	<b>.</b> -			
SUB MARKUP	0.00%				\$0			
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	. \$0	\$0	\$18,822 \$0 \$0 \$0		
JOB TOTAL						\$18,822		

Estimate: BLDG 6561 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY Job #:

94013.02

Location: Sq. footage:

City indx:Louisville, KY

SUMMARY

1	Manhours	Matl	Labor	Equipment	Sub	Total	
=========	=======	=======================================	=====				
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	207	\$776 \$11,333 \$331	\$1,601 \$4,710 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$16,043 \$402	
TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822	
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	40		
SUB MARKUP	0.00%	-			<b>\$</b> 0		
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	\$0	\$0	\$18,822 \$0 \$0 \$0 \$0	
JOB TOTAL				•		\$18,822	

U02 SITEWORK

\_\_\_\_\_\_\_ BLDG 6562 Date: 14-Oct-94 COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: 94013.02 Job #: FORT KNOX, KY Location: City indx:Louisville, KY 4800.00 Sq. footage: Line # Description Equipment Sub Matl Labor Manhours \_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 400.00 L.F. 4"DIAMETER 0.15 0.00 3.16 1.29 0.00 4.44 Unit values 60.00 \$0 \$514 \$0 \$1,262 \$1,776 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.50 Ton Unit values 0.00 380.36 0.00 0.00 380.36 14.55 Totals 7.27 \$0 \$190 \$0 \$0 \$190 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 200.00 L.F. 1.97 0.24 0.00 2.21 Unit values 0.07 0.00 \$442 \$395 \$47 \$0 Totals 14.20 \$0 0208401000 REMOVE INSULATION FROM PIPE FITTING, UP TO 4" DIAMETER PIPE 100.00 Ea. Unit values 0.20 0.00 5.55 0.68 0.00 6.23 Totals 20.00 \$0 \$555 \$68 \$0 \$623 0266907800 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 1.00 Ea. 5.91 300.98 1.56 259.60 35.47 0.00 Unit values \$6 Totals 1.56 \$260 \$35 ĠΟ \$301 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 1.92 Unit values 0.11 2.96 0.17 0.00 5.06 \$148 Totals 5.35 \$96 \$9 \$0 \$253

\$356

\$2,585

\$644

109

\$0

\$3,585

	=========	=======	========	=======	========	
Line #	Descriptio	n				
	Manhours	Matl	Labor I	Equipment	Sub	Total
=======================================	========	=======	=======	=======	=======	========
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	(See Att	ached for 1.00	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		18822.00 \$18,822
1562600137	GAS APPLIA	NCE REGUL	ATORS DOU	BLE DIAPHR	AGM	
13020020	TYPE 1-1/4	" PIPE SI	ZE		1.00	Ea.
Unit values	0.53		12.10	0.00	0.00	
Totals	0.53	\$226	\$12	\$0	\$0	\$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$18,822	\$19,060

_===========								
Line #	Description							
	Manhours	Matl	Labor	Equipment	Sub	Total		
==========	========	=======	======					
ESTIMATE TOTAL	110	\$582	\$2,597	\$644	\$18,822	\$22,645		
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0			•			
LABOR MARKUP EQUIPT MARKUP	0.00% 0.00%		\$0	\$0				
SÜB MARKUP	0.00%				\$0			
CONTINGENCY.	ONTINGENC	\$582	\$2,597	. \$644	\$18,822	\$22,645 \$2,265		
BOND PROFIT	0.00% 10.00%					\$0 \$2,265		
JOB TOTAL	•					\$27,174		

, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Estimate:

BLDG 6562

Date:

14-Oct-94

Page 4

Description:

COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

Project: Location:

JOB TOTAL

FORT KNOX, KY

Job #:

94013.02

Sq. footage: 4800.00

City indx:Louisville, KY

SUMMARY Manhours Matl Labor Equipment Sub \_\_\_\_ \$0 \$356 \$2,585 \$644 \$3,585 U02 SITEWORK 109 \$18,822 \$19,060 1 \$226 \$12 \$0 U15 MECHANICAL \$582 \$644 \$18,822 TOTAL 110 \$2,597 \$22,645 SALES TAX 0.00% \$0 MATL MARKUP 0.00% \$0 \$0 LABOR MARKUP 0.00% \$0 EOUIPT MARKUP 0.00% \$0 SUB MARKUP 0.00% \$2,597 \$644 \$18,822 \$22,645 TOTAL BEFORE CONTINGENC \$582 \$2,265 CONTINGENCY 10.00% \$0 0.00% BOND \$2,265 PROFIT 10.00%

\$27,174

BLDG 6562 14-Oct-94 Estimate: Date: INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 300.00 L.F. Unit values 2.22 4.57 0.15 0.00 0.00 6.79 Totals 44.70 \$665 \$1,372 \$0 \$0 \$2,037 0913100200 . CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 50.00 L.F. 0.00 Unit values 0.15 2.22 4.57 0.00 6.79 Totals 7.45 \$111 \$229 \$0 \$0 \$340 A09 ELECTRICAL 53 \$776 \$1,601 \$0 \$0 \$2,377

================	=======	========	=======		======	
Line #	Descripti	on	, 			
	Manhours	Matl		Equipment	Sub	Total
=======================================	=======	=======	========			
1517010650	BLACK STE			CHEDULE 40,	THREADED, 275.00	L.F.
Unit values Totals	0.44	4.17 \$1,147			0.00 \$0	14.47 \$3,980
1517011310	GAS SERVI FOR CVRG	CE PIPE ST 10'OC 1/2"	EEL GALV	SCH 40 THRD	W/CPLG 8 330.00	HNGR SZD L.F.
Unit values Totals	0.13 41.91	1.64 \$541	2.88 \$949		0.00 \$0	4.52 \$1,490
1519010320	ALUMINUM	REFLECTORS	W/HANGE	RS	38.00	Ea
Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145		0.00	43.59 \$1,657
1524105040	VACUUM PU	MP AND VEN	T PIPING		1.00	Ea.
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120		0.00 \$0	858.50 \$858
1552301020	CRV-100 G	AS FIRED B	URNER, 10	00 MBH & CO	MBUSTION 6.00	CHAMBER Ea
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00	0.00 \$0	904.06 \$5,424
1554510220	CO-RAY-VA	C VANTAGE	2 INFA-RI	HTG UNIT,	GAS 40 ME 2.00	
Unit values Totals	4.00 8.00	935.00 \$1,870	81.70 \$163	0.00 \$0	0.00	1016.70 \$2,033
1556800120	CO-RAY-VA	C VANTAGE	2 VENT P	IPE	2.00	Fa
Unit values Totals	1.60 3.20	70.00 \$140	76.50 \$153	0.00 \$0	0.00	146.50
1574205220	ELECTRIC	THERMOSTAT	W/ COVE	R AND WIRING	3.00	Ea
Unit values Totals	1.00	75.00 \$225	27.55 \$83	0.00 \$0	0.00	102.55 \$308
U15 MECHANICAL	207	\$11,333	\$4,710	\$0	\$0	\$16,043

=======================================	========	=======	=======	========	=======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	========				
1631200100	HEATING S	STEM POWI	ER / CONTE	ROL PANEL	1.00	Po.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

<b>7</b> ==========	========	=======	=======	=========				
Line #	Description ·							
	Manhours	Matl	Labor	Equipment	Sub	Total		
==============	:=======		======					
ESTIMATE TOTAL	J 263	\$12,440	\$6,382	\$0	\$0	\$18,822		
SALES TAX MATL MARKUP	0.00%	\$0 \$0	ė o					
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0			
TOTAL BEFORE C CONTINGENCY BOND PROFIT	CONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	\$0	\$0	\$18,822 \$0 \$0 \$0		
JOB TOTAL						\$18,822		

Estimate:

BLDG 6562 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE

Description: Project:

LIMITED EEAP (GLASSBID Date: FORT KNOX, KY Job #:

Location:

Job #: 94013.02

Sq. footage:

City indx:Louisville, KY

SUMMARY						
	Manhours	Matl	Labor	Equipment	Sub	Total
==========	=======	========	=======	=======		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL		\$776 \$11,333 \$331	\$1,601 \$4,710 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$16,043 \$402
TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0		
EQUIPT MARKUP SUB MARKUP	0.00%			γo	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	\$0	\$0	\$18,822 \$0 \$0 \$0 \$0
JOB TOTAL						\$18,822

		=======				
Estimate: Description:	BLDG 6563 COST ESTIN	MATE	Date:	14-Oct-94		========
Estimate: Description: Project: Location: Sq. footage:	LIMITED EF	EAP (GLASS KY	SBid Date: Job #: City inde	94013.02 :Louisville		
5q. 100tage:	4000.00 ========	======	city indx	:Louisville	, KY =======	
Line #	Description	on . <b></b>		·		
	Manhours		Labor	Equipment	Sub	Total
					=======	=======
0205543200	SITE REMOV	AL, STEEL	PIPE, WEL	DED CONNECT	ION,	T 10
Unit values	0.15	0.00	3.16	1.29	400.00	
Totals	60.00	\$0	\$1,262	\$514		\$1,776
0207183600	HVAC DEMO,	MECH EQF	T HEAVY I	rem ·	0.50	<b></b>
Unit values	14.55	0.00	380 36	0.00	0.50 0.00	380.36
Totals	7.27		\$190	\$0	\$0	\$190
0208400600	REMOVE PIP	E INSULA	TION UP TO	O 4" DIAMET	ER PIPE 200.00	T 17
Unit values	0.07	0.00	1.97	0.24	0.00	2.21
Totals	14.20	\$0	\$395	\$47	\$0	\$442
0208401000	REMOVE INS	ULATION IPE	FROM PIPE	FITTING, U	P TO 4"	Fa
Unit values	0.20	0.00	5.55	0.68	0.00	6.23
Totals	20.00	\$0	\$555	. \$68	\$0	\$623
0266907800			UCK TIP GA	ASKET, 4" Di	AMETER 1.00	Ea
Unit values Totals	1.56			5.91	0.00	300.98
	1.56	\$260	\$35	\$6	\$0	\$301
0268520550	GAS SERVICE END, TAR CO	E&DISTRI AT&WRAP	B PIPING,S	SCH40 STEEL	PLAIN 50.00	T. 12
Unit values	0.11	1.92	2.96	0.17	0.00	5.06
Totals	5.35	\$96		\$9		\$253
U02 SITEWORK	109	\$356	\$2,585	\$644	\$0	\$3 <b>,</b> 585

	========		=======	========	========	========
Line #	Description	n				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======	:=======	========	========
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	I (See Atta	ched for I	
Unit values Totals	0.00 0.00	0.00 \$0	0.00 \$0	0.00 \$0	18822.00 \$18,822	18822.00 \$18,822
1562600137		NCE REGUL		BLE DIAPHR		<b>7</b> 7 -
Unit values Totals	TYPE 1-1/4 0.53 0.53	" PIPE SIS 226.00 \$226	12.10 \$12	0.00 \$0	1.00 0.00 \$0	238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$18,822	\$19,060

======================================		========		=======	=========		
Line #	Description						
	Manhours	Matl	Labor · Eq	uipment	Sub	Total	
=======================================		=======================================					
ESTIMATE TOTAL	110	\$582	\$2,597	\$644	\$18,822	\$22,645	
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0					
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		\$0	\$0	\$0		
•	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$18,822	\$22,645 \$2,265 \$0 \$2,265	
JOB TOTAL						\$27,174	

Estimate: BLDG 6563
Description: COST ESTIMATE

Date: 14-Oct-94

Project: Location: LIMITED EEAP (GLASSBid Date:

FORT KNOX, KY Job #:

94013.02

Sq. footage: 4800.00 

City indx:Louisville, KY

CIIMMARV

SUMMARY						
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	======				=======
U02 SITEWORK U15 MECHANICAL	109 1	\$356 \$226	\$2,585 \$12	\$6 <b>44</b> \$0	\$0 \$18,822	\$3,585 \$19,060
TOTAL	110	\$582	\$2,597.	\$644	\$18,822	\$22,645
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	. \$0		
SUB MARKUP	0.00%			ŞU	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,597	\$644	\$18,822	\$22,645 \$2,265 \$0 \$2,265
JOB TOTAL	•					\$27,174

18-Oct-94

\_\_\_\_\_\_\_\_ BLDG 6563 14-Oct-94 Estimate: Date: INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP (GLASSBid Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description . . . . . . . . . . . . . . . . Manhours Matl Labor Equipment Sub \_\_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 AND RECEPTACLES 300.00 L.F. Unit values 0.15 2.22 4.57 0.00 6.79 0.00 Totals 44.70 \$665 \$1,372 \$0 \$0 \$2,037 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 50.00 L.F. Unit values 0.15 2.22 4.57 0.00 0.00 6.79 Totals 7.45 \$111 \$229 \$0 \$0 \$340 A09 ELECTRICAL 53 \$776 \$1,601 \$0 \$0 \$2,377

_==========	========	=======	======		======	=======
Line #	Description	on				
	Manhours			Equipment		Total
=======================================	=======	=======	======	========		
						4 11 5 7 5 7 7
1517010650	W/CPLGS			CHEDULE 40,	275.00	L.F.
Unit values Totals	0.44	4.17 \$1,147	10.30 \$2,833	0.00 \$0		14.47 \$3,980
1517011310	GAS SERVI	CE PIPE ST 10'OC 1/2"	EEL GALV DIAM	SCH 40 THRI	W/CPLG 8	MNGR SZD L.F.
Unit values Totals	0.13 41.91	1.64 \$541	2.88 \$949	0.00 \$0	0.00 \$0	4.52 \$1,490
1519010320	ALUMINUM :	REFLECTORS	W/HANGE	RS	38.00	To.
Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145	0.00 . \$0	0.00	43.59 \$1,657
1524105040	VACUUM PU	MP AND VEN	T PIPING		1.00	Eo
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00 \$0	0.00	858.50 \$858
1552301020	CRV-100 G	AS FIRED B	URNER, 1	00 MBH & CO	MBUSTION 6.00	CHAMBER
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	904.06 \$5,424
1554510220	CO-RAY-VA	C VANTAGE	2 INFA-R	D HTG UNIT,	GAS 40 MI 2.00	BH Fa
Unit values Totals	4.00 8.00	935.00 \$1,870	81.70 \$163	0.00 \$0	0.00 \$0	1016.70 \$2,033
1556800120	CO-RAY-VA	C VANTAGE	2 VENT P	IPE	2.00	Eo
Unit values Totals	1.60 3.20	70.00 \$140	76.50 \$153	0.00 \$0	0.00	146.50
1574205220	ELECTRIC '	THERMOSTAT	W/ COVE	R AND WIRING	3 00	П-
Unit values Totals	1.00	75.00 \$225	27.55 \$83		3.00 0.00 \$0	102.55 \$308
U15 MECHANICAL	207	\$11,333	\$4,710	\$0	\$0	\$16,043

=======================================	========	=======	=========	======				
Line #	Description							
	Manhours	Matl	Labor Eq	uipment	Sub	Total		
=======================================	=======	=======	=======================================	=======		=======================================		
1631200100	HEATING SY	YSTEM POWE	ER / CONTROL	·PANEL				
1631200100	1111111111000.				1.00	Ea.		
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00 \$0	401.34 \$402		
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402		

	=======	=======	=======			========
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========	======	==========	========	**======
ESTIMATE TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822
SALES TAX MATL MARKUP	0.00% 0.00%	\$0 \$0				
LABOR MARKUP EQUIPT MARKUP	0.00% 0.00%		\$0	\$0		
SUB MARKUP	0.00%			7	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	<b>\$</b> 0	\$0	\$18,822 \$0 \$0 \$0
JOB TOTAL .						\$18,822

\_\_\_\_\_\_

Estimate:

BLDG 6563

Date: 14-Oct-94

Description: Project:

INFRARED HEATING SYSTEM COST ESTIMATE

LIMITED EEAP (GLASSBID Date: FORT KNOX, KY

Job #: . 94013.02

Location: Sa footage:

City indx:Louisville, KY

Sq. rootage:	City Than Louis Title, At						
=======================================	======= S	UMMARY					
	Manhours	Matl	Labor	Equipment	Sub	Total	
=======================================	=======		=======			=======	
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	53 207 3	\$776 \$11,333 \$331	\$1,601 \$4,710 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$16,043 \$402	
TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822	
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0				
EQUIPT MARKUP SUB MARKUP	0.00%		1	\$0	\$0		
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	\$0	\$0 ·	\$18,822 \$0 \$0 \$0 \$0	
JOB TOTAL						\$18,822	

					=======	========
Estimate: Description:	BLDG 6564 COST ESTIM	ATE	ate:	14-Oct-94		
Project: Location: Sg. footage:	LIMITED EE FORT KNOX, 4800.00	AP (GLASSE KY	OD #:	94013.02 Louisville,	KY	
=======================================		=======	======			
Line #	Description	n 				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
0205543200	SITE REMOV	:R		ED CONNECT	400.00	
Unit values Totals	0.15 60.00		3.16 \$1,262	1.29 \$514		4.44 \$1,776
0207180380	HVAC DEMO,	BOILER GA	AS/OIL STI	>150MBH	1.00	E a
Unit values Totals	12.00	0.00 \$0	323.82 \$324	· 0.00 \$0		323.82 \$324
0207183600	HVAC DEMO,	MECH EQP	r heavy it	EM		-
Unit values Totals	14.55 7.27	0.00	380.36 \$190	0.00	0.50 0.00 \$0	380.36 \$190
0208400600	REMOVE PIE	E INSULA	TION UP TO	4" DIAMET	ER PIPE 200.00	ים ד
Unit values Totals	0.07 14.20	0.00 \$0	1.97 \$395	0.24 \$47	0.00	2.21 \$442
0208401000	REMOVE INS		FROM PIPE	FITTING, U	P TO 4"	Ea.
Unit values Totals	0.20 20.00	0.00	5.55 \$555		0.00	6.23 \$623
0266907800	CUT IN VAI	VES, W/D	JCK TIP GA	SKET, 4" D	IAMETER 1.00	T-2
Unit values Totals	1.56 1.56	259.60 \$260	35.47 \$35	5.91 \$6	0.00	300.98
0268520550	GAS SERVICEND, TAR CO	CE&DISTRI	B PIPING, S	CH40 STEEL	PLAIN 50.00	L.F.
Unit values Totals	0.11 5.35	1.92 \$96	2.96 \$148			5.06
U02 SITEWORK	121	\$356	\$2,909	\$644	\$0	\$3,909

L==========		=======	=======			=======
Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======			<b></b>		
1554510245	HTG INFA-RD	UNT GAS	ELEC IGN	(See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		18822.00 \$18,822
1562600137	GAS APPLIAN TYPE 1-1/4"			BLE DIAPHR	AGM 1.00	Ea.
Unit values Totals	0.53		12.10 \$12	0.00 \$0	0.00 \$0	238.10 \$238
U15 MECHANICAL	1	\$226	\$12	\$0	\$18,822	\$19,060

	========	========	=======	=========	=======	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======	========	======:	========
ESTIMATE TOTAL	122	\$582	\$2,921	\$644	\$18,822	\$22,969
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00% 0.00%	\$0	\$0			
EQUIPT MARKUP	0.00% 0.00%			\$0	\$0	
SUB MARKUP	0.00%				•	
TOTAL BEFORE C	ONTINGENC 10.00%	\$582	\$2,921	\$644	\$18,822	\$22,969 \$2,297
BOND	0.00%					\$0
PROFIT	10.00%		•			\$2,297
JOB TOTAL ·						\$27,563

Estimate: BLDG 6564
Description: COST ESTIMATE

Date: 14-Oct-94

Project:

LIMITED EEAP (GLASSBid Date:

Location:

FORT KNOX, KY Job #: 94013.02
4800.00 City indx:Louisville, KY

Sq. footage:	4800.00	) :	City indx	:Louisville	, KI ========	
=======================================	SI	JMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
==========	========	=======	======			
U02 SITEWORK U15 MECHANICA	121 L 1	\$356 \$226	\$2,909 \$12	\$644 \$0	\$0 \$18,822	\$3,909 \$19,060
TOTAL	122	\$582	\$2,921	\$644	\$18,822	\$22,969
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	CONTINGENC 10.00% 0.00% 10.00%	\$582	\$2,921	\$644	\$18,822	\$22,969 \$2,297 \$0 \$2,297
JOB TOTAL					•	\$27,563

BLDG 6564 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: 94013.02 FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description \_\_\_\_\_ Labor Equipment Manhours Matl 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 300.00 L.F. AND RECEPTACLES 6.79 2.22 4.57 0.00 0.00 0.15 Unit values \$0 \$2,037 Totals 44.70 \$665 \$1,372 \$0 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 50.00 L.F. 6.79 2.22 4.57 0.00 0.00 Unit values 0.15 \$229 \$0 \$0 \$340 7.45 \$111 Totals \$0 \$0 \$2,377 \$1,601 A09 ELECTRICAL 53 \$776

				======		======	
Line #	Description						
=======================================	Manhours	Matl	Labor	Equipme	ent 	Sub	Total
===========	=======	=======	======				
131,01000	BLACK STE					275.00	L.F.
Unit values Totals	0.44 122.10	4.17 \$1,147	10.30 \$2,833	. 0	.00 \$0		14.47 \$3,980
1517011310	GAS SERVI	CE PIPE ST 10'OC 1/2"					L.F.
Unit values Totals	0.13 41.91	1.64	2.88 \$945	0	.00 \$0	0.00 \$0	4.52 \$1,490
1519010320	ALUMINUM :	REFLECTORS	W/HANG	ERS		38.00	Ea.
Unit values Totals	0.50 19.00	39.79 \$1,512	3.80 \$145	0	.00 \$0	0.00	43.59 \$1,657
1524105040	VACUUM PU	MP AND VEN	T PIPINO	3		1.00	Ea.
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120		00 \$0	0.00	858.50 \$858
1552301020	CRV-100 G	AS FIRED B	URNER,	LOO MBH	& CO	MBUSTION 6.00	CHAMBER Ea.
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	5 0 1	.00 \$0	0.00	904.06 \$5,424
1554510220	CO-RAY-VA	C VANTAGE	2 INFA-1	RD HTG U	NIT,	GAS 40 MI 2.00	BH Ea.
Unit values Totals	4.00 8.00	935.00 \$1,870	81.70 \$16	0	.00 \$0	0.00	1016.70 \$2,033
1556800120	CO-RAY-VA	C VANTAGE	2 VENT	PIPE		2.00	Ea.
Unit values Totals	1.60 3.20	70.00 \$140	76.5 \$15	0	.00 \$0	0.00	146.50 \$293
1574205220	ELECTRIC	THERMOSTAT	W/ COV	ER AND W	IRING	3.00	Ea
Unit values Totals	1.00	75.00 \$225	27.5 \$8		.00 \$0	0.00	102.55 \$308
U15 MECHANICAL	207	\$11,333	\$4,71	0	\$0	\$0	\$16,043

	=======	=======	=======		=======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	========	=======			
1631200100	HEATING S	STEM POW	er / conti	ROL PANEL	1.00	Ea.
Unit values Totals	2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00 \$0	401.34 \$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

	=======	=======	=======		========	=======
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	=======			•	
ESTIMATE TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0	•		
EQUIPT MARKUP SUB MARKUP	0.00%		·	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	\$0	\$0	\$18,822 \$0 \$0 \$0 \$0
JOB TOTAL						\$18,822

Estimate:

BLDG 6564 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP(GLASSBid Date:

Description: Project:

Location:

Job #: 94013.02 FORT KNOX, KY

Sq. footage:

City indx:Louisville, KY

=======================================	======= S					
	Manhours	Matl	Labor	Equipment	Sub	Total
==============	========	======		=======		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	53 207 3	\$776 \$11,333 \$331	\$1,601 \$4,710 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$16,043 \$402
TOTAL	263	\$12,440	\$6,382	\$0	\$0	\$18,822
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0		•	
EQUIPT MARKUP SUB MARKUP	0.00%		7 -	\$0 •	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$12,440	\$6,382	\$0	\$0	\$18,822 \$0 \$0 \$0
JOB TOTAL						\$18,822

18-Oct-94

U02 SITEWORK

Date: 14-Oct-94 BLDG 6576 COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: Job #: 94013.02 FORT KNOX, KY Location: City indx:Louisville, KY 6900.00 Sq. footage: Description Labor Equipment Manhours Matl SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 320.00 L.F. 4"DIAMETER 3.16 4.44 0.00 1.29 0.00 0.15 Unit values \$0 \$1,421 \$411 \$0 \$1,010 Totals 48.00 HVAC DEMO, BOILER GAS/OIL STL >150MBH 0207180380 0.00 Ea. 0.00 0.00 323.82 323.82 0.00 Unit values 12.00 \$0 \$0 \$0 \$0 \$0 0.00 Totals HVAC DEMO, MECH EQPT HEAVY ITEM 0207183600 0.75 Ton 380.36 380.36 0.00 0.00 0.00 14.55 Unit values \$285 \$0 \$0 \$0 \$285 10.91 Totals REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 0.24 0.00 2.21 0.00 1.97 0.07 Unit values \$376 \$0 \$40 \$0 \$336 12.07 Totals REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 50.00 Ea. DIAMETER PIPE 6.23 5.55 0.68 0.00 0.00 Unit values 0.20 \$0 \$312 \$278 \$34 \$0 Totals 10.00 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 5.91 0.00 300.98 35,47 259.60 Unit values 1.56 \$301 \$6 \$0 \$260 \$35 Totals 1.56 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 50.00 L.F. END, TAR COAT&WRAP 1"DIAM 0.00 5.06 0.17 1.92 2.96 Unit values 0.11 \$0 \$253 \$9 5.35 \$96 \$148 Totals

\$2,948

\$0

\$500

\$2,092

\$356

88

Page 1

_==========	========	=======	=======		=======	=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======================================	======				
1554510245	HTG INFA-F	RD UNT GAS	ELEC IG	N (See Att	ached for	Breakdown)
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	21687.00 \$21,687	22610.40 \$22,610
1562600137	GAS APPLIA	NCE REGULA	ATORS DO	UBLE DIAPH	RAGM 1.00	Ea.
Unit values Totals	0.53 0.53		12.10 \$12	0.00 \$0	0.00	238.10 \$238
U15 MECHANICAL	9	\$986	\$175	\$0	\$21,687	\$22,848

<b>.</b>	========		=======		========	
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======	========		======
ESTIMATE TOTAL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,342	\$2,267	\$500	\$21,687	\$25,796 \$2,580 \$0 \$2,580
JOB TOTAL						\$30,955

Estimate:

Date: 14-Oct-94

Description:

BLDG 6576 COST ESTIMATE

Description: Project: Location: Sq. footage:	COST ESTIN LIMITED EN FORT KNOX, 6900.00	EAP (GLASS , KY	Job #:	94013.02 :Louisville	, KY			
SUMMARY								
	Manhours	Matl	Labor	Equipment	Sub	Total		
=======================================	=======================================	_ = = = = = = =						
U02 SITEWORK U15 MECHANICAL	88 9	\$356 \$986	\$2,092 \$175	\$500 \$0	\$0 \$21,687	\$2,948 \$22,848		
TOTAL	97	\$1,342	\$2,267	\$500	\$21,687	\$25,796		
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	<b>\$</b> 0	\$0	\$0			
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$1,342	\$2,267	\$500 •	\$21,687	\$25,796 \$2,580 \$0 \$2,580		
JOB TOTAL			•			\$30,955		

Estimate: BLDG 6576 Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP(GLASSBid Date: Project: 94013.02 Job #: FORT KNOX, KY Location: City indx:Louisville, KY Sq. footage: Description Line # Labor Equipment Sub Manhours Matl 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 230.00 L.F. AND RECEPTACLES 6.79 0.00 0.00 2.22 4.57 0.15 Unit values \$0 \$0 \$1,562 34.27 \$510 \$1,052 Totals CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, 0913100200 INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 6.79 0.00 0.00 4.57 0.15 2.22 Unit values \$0 \$815 \$0 \$549 \$266 17.88 Totals \$2,377 \$0 \$0 \$1,601 \$776 A09 ELECTRICAL 53

	========	=======	======		=======	
Line #	Description	n				
	Manhours			Equipment	Sub	Total
	========	:=======	======			
1517010650	BLACK STEE	L RADIANT	PIPE, S	CHEDULE 40,	THREADED 220.00	, 4" DIAM L.F.
Unit values Totals	0.44 97.68	4.17 \$917	10.30 \$2,267	0.00 \$0	0.00	
1517011310	FOR CVRG 1	0'00 1/2"	DTAM	SCH 40 THE	340.00	L.F.
Unit values Totals	0.13 43.18	1.64	2.88 \$978	0.00 \$0		4.52 \$1,536
1519010320	ALUMINUM R	EFLECTORS	W/HANGE	RS	29.00	Re
Unit values Totals	0.50 14.50	39.79 \$1,154			0.00	
1524105040	VACUUM PUM	IP AND VEN	T PIPING		1 00	
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120			858.50
1552301020	CRV-90 GAS	FIRED BU	RNER, 90	MBH & CON	BUSTION C	HAMBER
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	6.00 0.00 \$0	904.06 \$5,424
1554510160	CO-RAY-VAC	C VANTAGE	2 INFA-	RD HTG UNT,	GAS 100M	вн
Unit values Totals	6.00 6.00	1065.00 \$1,065	163.40 \$163			
1554510220	CO-RAY-VAC	C VANTAGE	2 INFA-R	D HTG UNIT,	GAS 40 M	BH
Unit values Totals	4.00 16.00	935.00 \$3,740	81.70 \$327		4.00 0.00 \$0	
1556800120	CO-RAY-VAC	C VANTAGE	2 VENT P	IPE	<b>5.00</b>	<b>T</b> -
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382		5.00 0.00 \$0	146.50
1574205220	ELECTRIC T	CHERMOSTAT	W/ COVE	R AND WIRI	IG	En
Unit values Totals	1.00 6.00	75.00 \$450	27.55 \$165		6.00 0.00 \$0	102.55

				<b></b>		
Line #	Descripti	lon				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100	HEATING S	SYSTEM POWE	R / CONTE	ROL PANEL		_
•					1.00	
Unit values	2.96	330.76	70.58	0.00	0.00	401.34
Totals	2.96	\$331	\$71	\$0	\$0	\$402
U16 ELECTRICAL	3	\$331	\$71	. \$0	\$0	\$402

=========	=======		=======			
Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
==========	=======	=======	======		:======:	
ESTIMATE TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00%	ŞU	\$0	40		
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE C	CONTINGENC	\$15,239	\$6,448	\$0	\$0	\$21,687
CONTINGENCY BOND	0.00% 0.00%					\$0 \$0 \$0
PROFIT	0.00%					\$0
JOB TOTAL					•	\$21,687

\_\_\_\_\_\_\_\_\_\_

Estimate: BLDG 6576 Date: 14-Oct-94 Description: INFRARED HEATING SYSTEM COST ESTIMATE

Description: Project:

LIMITED EEAP(GLASSBid Date:

Location:

FORT KNOX, KY Job #:

94013.02

Sq. footage:

City indx:Louisville, KY

sq. rootage.				,		<b></b>
	S	UMMARY	=			
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================						======
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	201	\$776 \$14,132 \$331	\$1,601 \$4,776 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$18,908 \$402
TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00%		7-	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

\_\_\_\_\_\_\_ Estimate: BLDG 6577 Date: 14-Oct-94 COST ESTIMATE Description: LIMITED EEAP(GLASSBid Date: Project: FORT KNOX, KY Job #: 94013.02 Location: 6900.00 City indx:Louisville, KY Sq. footage: Description Equipment Matl Labor Manhours \_\_\_\_\_ SITE REMOVAL, STEEL PIPE, WELDED CONNECTION, 0205543200 320.00 L.F. 4"DIAMETER 3.16 1.29 0.00 Unit values 0.15 0.00 4.44 \$411 \$0 Totals 48.00 \$0 \$1,010 \$1,421 0207180380 HVAC DEMO, BOILER GAS/OIL STL >150MBH 1.00 Ea. 0.00 323.82 Unit values 12.00 0.00 323.82 0.00 \$0 \$324 \$0 \$0 Totals 12.00 \$324 0207183600 HVAC DEMO, MECH EOPT HEAVY ITEM 0.75 Ton Unit values 14.55 0.00 380.36 0.00 0.00 380.36 \$285 \$0 \$0 Totals 10.91 \$0 \$285 REMOVE PIPE INSULATION UP TO 4" DIAMETER PIPE 0208400600 170.00 L.F. 0.00 1.97 0.24 0.00 2.21 0.07 Unit values \$0 \$336 \$40 \$0 \$376 12.07 Totals REMOVE INSULATION FROM PIPE FITTING, UP TO 4" 0208401000 50.00 Ea. DIAMETER PIPE 5.55 0.68 6.23 0.20 0.00 0.00 Unit values \$0 \$0 \$278 \$34 \$312 Totals 10.00 CUT IN VALVES, W/DUCK TIP GASKET, 4" DIAMETER 0266907800 1.00 Ea. 300.98 Unit values 1.56 259.60 35.47 5.91 0.00 \$6 \$0 \$301 Totals 1.56 \$260 \$35 GAS SERVICE&DISTRIB PIPING, SCH40 STEEL PLAIN 0268520550 END, TAR COAT&WRAP 1"DIAM 50.00 L.F. 2.96 5.06 1.92 0.17 0.00 Unit values 0.11 \$9 \$0 \$253 Totals 5.35 \$96 \$148 \$2,416 \$500 \$0 \$3,272 U02 SITEWORK 100 \$356

<u></u>	========	=======	=======		=======	========
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	========	:======:	========	=======================================	========	
1554510245	HTG INFA-R	D UNT GAS	ELEC IGN	N (See Atta	ched for 1.00	
Unit values Totals	8.00 8.00	760.00 \$760	163.40 \$163	0.00 \$0	21687.00	22610.40 \$22,610
1562600137				JBLE DIAPHR		7-
Unit values Totals	TYPE 1-1/4 0.53 0.53	226.00 \$226	12.10 \$12	0.00	1.00 0.00 \$0	238.10 \$238
U15 MECHANICAL	9	\$986	\$175	\$0	\$21,687	\$22.848

:	========					=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	109	\$1,342	\$2,591	\$500	\$21,687	\$26,120
SALES TAX	0.00%	\$0 \$0				
MATL MARKUP LABOR MARKUP	0.00% 0.00%	\$0	\$0			
EQUIPT MARKUP	0.00%		ŞU	\$0		
SUB MARKUP	0.00%			4.5	\$0	
	ONTINGENC	\$1,342	\$2,591	\$500	\$21,687	\$26,120
CONTINGENCY BOND	10.00% 0.00%					\$2,612
PROFIT	10.00%					\$0 \$2,612
TOD MOMENT						404 044
JOB TOTAL						\$31,344

\$31,344

\_\_\_\_\_

Estimate:

BLDG 6577

Date:

14-Oct-94

Description:

Project:

JOB TOTAL

COST ESTIMATE

LIMITED EEAP(GLASSBid Date:

Location: Sq. footage: FORT KNOX, KY 6900.00

Job #: 94013.02 City indx:Louisville, KY

	Si	JMMARY		,		
	Manhours	Matl	Labor	Equipment	Sub	Total
	=======	======				========
U02 'SITEWORK U15 MECHANICAL	100 9	\$356 \$986	\$2,416 \$175	\$500 \$0	\$0 \$21,687	\$3,272 \$22,848
TOTAL	109	\$1,342	\$2,591	\$500	\$21,687	\$26,120
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP	0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	¢o	
SUB MARKUP TOTAL BEFORE CO	0.00% ONTINGENC	\$1,342	\$2,591	\$500	\$0 \$21,687	\$26,120
CONTINGENCY BOND PROFIT	10.00% 0.00% 10.00%	, ,				\$2,612 \$0 \$2,612

\_\_\_\_\_\_ Estimate: BLDG 6577 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE LIMITED EEAP (GLASSBID Date: Description: Project: Location: FORT KNOX, KY Job #: City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment Sub Total 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 230.00 L.F. AND RECEPTACLES 4.57 2.22 0.00 Unit values 0.15 0.00 \$1,052 Totals 34.27 \$510 \$0 \$0 \$1,562 0913100200 CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 2.22 4.57 0.00 0.00 6.79 Unit values 0.15 Totals 17.88 \$266 \$549 \$0 \$0 \$815 \$776 \$1,601 \$0 \$0 A09 ELECTRICAL 53 \$2,377

	:=======		=======	========	=======	========
Line #	Description	on				
				Equipment		
=======================================	=======================================	========		========		
1517010650	/				~~~~	L.F.
Unit values Totals	0.44 97.68	4.17 \$917	10.30 \$2,267	0.00 \$0	0.00 \$0	14.47 \$3,184
1517011310	GAS SERVIO	CE PIPE ST LO'OC 1/2"	EEL GALV	SCH 40 THR	D W/CPLG 340.00	& HNGR SZD L.F.
Unit values Totals	0.13 43.18	1.64 \$558	2.88 \$978	0.00	0.00 \$0	4.52 \$1,536
1519010320	ALUMINUM F	REFLECTORS	W/HANGE	RS .	20.00	Fo
1519010320 Unit values Totals	0.50 14.50	39.79 \$1,154	3.80 \$110	0.00 \$0	0.00 \$0	43.59 \$1,264
1524105040	VACUUM PUN	IP AND VEN	T PIPING		1.00	E o
Unit values Totals	3.00	738.35 \$738	120.15 \$120	0.00 \$0	0.00	858.50
1552301020	CRV-90 GAS	FIRED BU	RNER, 90	MBH & COM	BUSTION C	HAMBER
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	0.00 \$0	0.00	904.06 \$5,424
1554510160	CO-RAY-VAC	C VANTAGE	2 INFA-	RD HTG UNT,		BH Ea.
Unit values Totals	6.00 6.00	1065.00 \$1,065	163.40 \$163	0.00 \$0	0.00	1228.40
1554510220	CO-RAY-VAC	VANTAGE	2 INFA-R	D HTG UNIT,		
Unit values Totals	4.00 16.00	935.00 \$3,740		0.00 \$0	4.00 0.00 \$0	1016.70 \$4,067
1556800120	CO-RAY-VAC	VANTAGE	2 VENT P	IPE.	5.00	E.
Unit values Totals	1.60 8.00				0.00	146.50 \$732
1574205220	ELECTRIC T	HERMOSTAT	W/ COVE	R AND WIRING	G 6.00	₽a.
Unit values Totals	1.00 6.00	75.00 \$450				102.55 \$615

_======================================						
Line #	Descripti	lon				
	Manhours	Matl	Labor	Equipment	Sub	Total
U15 MECHANICAL	201	\$14,132	\$4,776	\$0	\$0	\$18,908
1631200100	HEATING S	SYSTEM POWE	R / CONT	ROL PANEL		
1031200100			,		1.00	Ea.
Unit values	2.96	330.76	70.58	0.00	0.00	401.34
Totals	2.96	\$331	\$71	\$0	\$0	\$402
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

		=======	=======		=======	
Line #	Descripti	.on			•	
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	= = = = = = = = = = = = = = = = = = = =					
ESTIMATE TOTAL	և 257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$0	\$0	\$0	
TOTAL BEFORE O CONTINGENCY BOND PROFIT	CONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

Estimate: BLDG 6577 Date: 14-Oct-94
Description: INFRARED HEATING SYSTEM COST ESTIMATE
Project: LIMITED EEAP(GLASSBID Date:
Location: FORT KNOX, KY Job #: 94013.02

Sq. footage:

City indx:Louisville, KY

Sq. Iootage:	0107 1110111200111, 111
and the second s	MMARY

	U	OI II II II I				
	Manhours	Matl	Labor	Equipment	Sub	Total
==========		=======	========	=======		
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	201	\$776 \$14,132 \$331	\$1,601 \$4,776 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$2,377 \$18,908 \$402
TOTAL	257	\$15,239	\$6,448	\$0	\$0	\$21,687
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$15,239	\$6,448	\$0	\$0	\$21,687 \$0 \$0 \$0
JOB TOTAL						\$21,687

•		FT KNOX LIMITED			9	EEAP (GLASS)			
	EC	:0 - 1: INFR	RARED	ECO - 1: INFRARED HEATING CALCULATIONS	ರ	JLATIONS			
BUILDING NUMBER:	6560		BUILDING OUTSIDE I TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60	<u> </u>	PAGE	E10F3
INFILTRATION LOSSES =	-	AIR CHGS X	73600	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR FEET OF PERIMETER	EET OF PE	RIMETER X	59	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.03	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
CORR MTL PNL WALL =		AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	1123	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	П	0.08	MBTU / HR
TINTED DBL PANE WIN'W =		 AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE: DIFFERENCE	11	0.00	MBTU / HR
METAL ROLL UP DOORS =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL GLAZED O'HEAD DR =	1372	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	<del>-</del>	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA(SF) X	0.615	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR
				TOTAL BASEL	Ä.	TOTAL BASELINE HEAT LOSSES	11 11	0.28 299.19	MBTU / HR MJ/HR

(FYSS)
9
Д Д
<u> </u>
Х П
9
Ž

# **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAGE 2 OF	2 OF 3
BUILDING NUMBER:	0999	80 F	JILDING F UTSIDE D EMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	URE SETPOI RE	55	<u> </u>		
INFILTRATION LOSSES =	-	AIR CHGS X	73600	VOL (CU FT) X 54 F TEMP DIFF	F TEMP DIF	F X 0.019	11	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR FEET OF PERIMETER	T OF PEF	RIMETER X 54	F TEMP DIFF	F X 0.81	li li	0.01	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ 54 HR - SF - F) X	. U	TEMPERATURE DIFFERENCE	H	0.03	MBTU / HR
FACE BRICK/BLK WALL ≈	0	AREA (SF) X	0.176	U VALUE (BTU/ 54 HR - SF - F) X	щ	TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	AREA (SF) X	0.389	U VALUE (BTU/ 54 HR - SF - F) X	щ	TEMPERATURE DIFFERENCE	Ħ	0.05	MBTU/HR
CORR MTL PNL WALL =	0	AREA (SF) X	0.17	U VALUE (BTU/ 54 HR - SF - F) X	Щ	TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR
CLR SGL PANE WINDOWS =	1123	AREA (SF) X	1.235	U VALUE (BTU/ 54 HR - SF - F) X	щ.	TEMPERATURE DIFFERENCE	П	0.07	MBTU / HR
TINTED DBL.PANE WIN'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ 54 HR - SF - F) X	ட	TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL ROLL UP DOORS ==	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	щ	TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	1372	AREA (SF) X	0.214	U VALUE (BTU/ 54 HR - SF - F) X	L.	TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
LG MTL SLIDING DOOR =	,0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	L	TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	т	TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X · 54	π	TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR

MBTU / HR MJ/HR

11 11

### **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	-
HTG TEMP SETPOINT (F)	09	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES (MBTU / HR)	0.28	0.26
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

<b>BUILDING NUMBER</b>	6560
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLA	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIR	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FRO	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

	ANNUAL HEATIN	TING ENERGY	IG ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY METH	OC)	
BASELINE =	0.28		MBTU/HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	= 887.50	MBTU/YR	
	887.50	MBTU/YR X	CORR FACTOR 1		887.50	MBTU/YR
ECO - 1=	0.26	MBTU / HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	.= 435.29	MBTU/YR	
	435.29	MBTU/YR X	CORR FACTOR 1	11	435.29	MBTU/YR
	ECO - 1 ANN	ANNUAL HEATING EI	UAL HEATING ENERGY CONSUMPTION SAVINGS	11 11	452.21 477,080.96	MBTU/YR MJ/YR

	ANNUAL	<b>ANNUAL HEATING ENERGY COST</b>	ENERG	Y COST				
BASELINE =	887.50	MBTU/YR X 6.6	6.6	\$ /MBTU	11	5,857.50 \$ /YR	\$ /YR	•
ECO - 1 =	435.29	MBTU / YR X 4.62	4.62	\$ /MBTU	u '	2,011.04 \$ /YR	* XR	
	ECO - 1 ANN	UAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS	11	3,846.46 \$ /YR	<b>\$</b> /⁄ R	

		FT KNOX	OX LIMITED		9	EEAP (GLASS)			•
	Щ	30 - 1: INFR	ARED !	<b>ECO - 1: INFRARED HEATING CALCULATIONS</b>	$\vec{\Sigma}$	JLATIONS	,		
								PAGE	1 OF 3
BUILDING NUMBER:	6561		UILDING H OUTSIDE DE EMPERATU	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE	SETPOINT: 60	_ 		
INFILTRATION LOSSES =	-	AIR CHGS X	73600	VOL (CUFT) X	59	F TEMP DIFF X 0.019	II .	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR FEET OF PERIMETER	ET OF PER	IMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES	7800	V (SE) X	, , ,	U VALUE (BTU/	C V	F TEMPERATURE	1	ç	
FACE BRICK/BLK WALL =			0.176	HR - SF - F) X U VALUE (BTU/ HR - SF - F) X	59	DIFFERENCE F TEMPERATURE DIFFERENCE	1 11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	- 11	90:0	MBTU / HR
CORR MTL PNL WALL =		AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	В	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	1123	AREA (SF) X.	1.235	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	Н	0.08	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	. 11	00.0	MBTU / HR
- METAL ROLL UP DOORS =		- AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
METAL GLAZED O'HEAD DR =	1372	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	00.00	MBTU / HR
METAL PERSONNEL DR=		_ AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA(SF) X	0.615	U VALÚE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
		l					I		

MBTU / HR MJ/HR

0.28 299.19

11 11

TOTAL BASELINE HEAT LOSSES

		1	)
	(		)
	•		ļ
	7	ľ	,
	•	_	_
	(	1	_
	•	1	
	L	Ī	j
	Ĺ	L	j
	(	=	)
	Ĺ	I	j
	ŀ	-	-
		5	
			=
	-		J
	>	×	
	(		)
	7	2	_
	-	<	•
	ŀ		-
•	Ĺ	L	_

# **ECO - 1: INFRARED HEATING CALCULATIONS**

OF 3		MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR	MBTU / HR
PAGE 2 OF		0.08	0.01	0.03	0.00	0.05	00.00	0.07	00.00	00.00	0.02	0.00	0.00	0.00
	шшш	H	11	п	II	II	Ħ	II	11	II	11	11	11	11
	(E SETPOINT: 55	F TEMP DIFF X 0.019	F TEMP DIFF X 0.81	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE	F TEMPERATURE DIFFERENCE
	ATURE TURE	54	54 F	54	54	54	54	54	54	54	54	54	54	54
	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	VOL (CUFT) X	PERIMETER X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X	U VALUE (BTU/ HR - SF - F) X
	SUILDING SUTSIDE FEMPER	73600	LINEAR FEET OF P	0.105	0.176	0.389	0.17	1.235	0.65	0.56	0.214	0.56	0.56	0.615
		×	Ä F	×	×	×	×	×	×	×	×	×	×	×
		AIR CHGS	LINEA	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA (SF)	AREA.(SF)
	6561	<del></del>	320	4800	0	2440	0	1123	Ö	0	1372	0	0	25
	BUILDING NUMBER:	INFILTRATION LOSSES =	FLOOR LOSSES =	SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	FACE BRICK/BLK WALL =	8" CINDER BLOCK WALL =	CORR MTL PNL WALL =	CLR SGL PANE WINDOWS =	TINTED DBL PANE WIN'W ≈	METAL ROLL UP DOORS =	WOOD GLAZED O'HEAD DR =	LG MTL SLIDING DOOR =	METAL PERSONNEL DR=	MTL/ GLAZED PERSONNEL=

MBTU / HR MJ/HR

0.26 273.83

11 11

### **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	_	τ-
HTG TEMP SETPOINT (F)	09	52
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0.08	900
(MBTU / HR)	0.40	2
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

<b>BUILDING NUMBER</b>	6561
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLAE	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRI	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

4	ANNUAL HE	ATING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	DEGREE DA	AY METH	(00)	
BASELINE =	0.28	MBTU / HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	1	= 887.50	MBTU/YR	
	887.50	MBTU/YR X	CORR FACTOR 1		II	887.50	MBTU/YR
ECO - 1=	0.26	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 . TEMP DIFFERENCE	1	= 435.29	MBTU/YR	
	435.29	MBTU/YR X	CORR FACTOR	_	11	435.29	MBTU/YR
	ECO - 1 ANNU	ANNUAL HEATING E	AL HEATING ENERGY CONSUMPTION SAVINGS		H II	452.21 477,080.96	MBTU/YR MJ/YR

1 and	ANNOAL	<b>ANNUAL HEATING ENERGY COST</b>	NERG	Y COST			
BASELINE =	887.50	MBTU/YR X 6.6	6.6	\$ /MBTU	II	5,857.50 \$ MR	\$ 7R
ECO - 1 =	435.29	MBTU/YR X 4.62	4.62	\$ /MBTU	II	2,011.04 \$ MR	\$ YR
	ECO. 1 ANNI	ECO 1 ANNITAL HEATING ENERGY COST SAVINGS = 3.846.46 \$ /YR	:NFRGY	SOST SAVING	II V	3 846 46	<b>\$</b> /YR

		T KNOX	LIMI	FT KNOX LIMITED EEAP (GLASS)	9	LASS)			
	Ш	30 - 1: INFF	RARED	ECO - 1: INFRARED HEATING CALCULATIONS	, 5 L	JLATIONS			
								PAGE 1	1 OF 3
BUILDING NUMBER:	6562	ı	BUILDING I OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE JRE	60	╛ <del></del> ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・		
INFILTRATION LOSSES =	-	AIR CHGS X	73600	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR F	FEET OF PERIMETER	RIMETER X	59	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.03	MBTU/HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
CORR MTL PNL WALL =		AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	1123	1123 AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.08	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X .	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL ROLL UP DOORS =		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	ll.	0.00	MBTU / HR
METAL GLAZED O'HEAD DR =	1372	AREA (SF) X	0.214	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
LG MTL SLIDING DOOR =		– AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL BASEL	INE	TOTAL BASELINE HEAT LOSSES	11 11	0.28 299.19	MBTU / HR MJ/HR

# **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 2 OF 3

BUILDING NUMBER:	6562	ш О 1	BUILDING	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE	ATUR 'URE		ᆜ <u>╙╙</u> ╷		
		_	I EMPEK?	NOKE DIFFERENCE		54 F	<u>.</u>		
	_	AIR CHGS X	73600	VOL (CUFT) X	54 F	F TEMP DIFF X 0.019	II	0.08	_MBTU/HR
Ś	320	LINEAR FEET OF		PERIMETER X	54 F	F TEMP DIFF X 0.81	II	0.01	MBTU / HR
48	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	. 11	0.03	MBTU / HR
0		AREA (SF) X	0.176	_	54	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
2440	0	AREA (SF) X	0.389	_	24	F TEMPERATURE DIFFERENCE	н	0.05	MBTU / HR
0		AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
1123		AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.07	MBTU / HR
0		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	П	0.00	MBTU / HR
0		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
1372	٠.	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
0		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
0		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
25		AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
							!		I

MBTU / HR MJ/HR

11 11

### **ECO - 1: INFRARED HEATING CALCULATIONS**

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	_	-
HTG TEMP SETPOINT (F)	09	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0.28	0.26
(MBIO/HK)		
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

	GLOSSARY OF TERMS			81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2
6562	GLOS			AB PERIME	RICAL COF	M ASHRA
<b>BUILDING NUMBER</b>		1 MBTU = 1055 MJ	0.019=CONSTANT	.81 = CONSTANT FOR SL	CORR FACTOR = EMPIF	65 F DEGREE-DAYS FRC

A	ANNUAL HEATIN	ATING ENERGY	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY M	ETHOI	(C	
BASELINE =	0.28	MBTU / HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	<b>&amp;</b>	887.50	MBTU/YR	
	887.50	MBTU/YR X	CORR FACTOR 1	II		887.50	MBTUMR
ECO - 1 =	0.26	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE.	ii 4	435.29	MBTU/YR	
	435.29	MBTU/YR X	CORR FACTOR 1	II	ı	435.29	MBTU/YR
	ECO - 1	ANNUAL HEATING	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 11 S		452.21 477,080.96	MBTU/YR MJ/YR

	ANNUAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST				
BASELINE =	887.50	MBTU/YR X 6.6	6.6	\$ /MBTU	11	5,857.50 \$ /YR	\$ /YR	
ECO - 1 =	435.29	MBTU/YR X 4.62	4.62	\$ /MBTU	11	2,011.04 \$ /YR	* WR	
	ECO - 1 ANNI	UAL HEATING E	ENERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS =	II	3,846.46 \$ /YR	\$ /⁄R	

### **ECO - 1: INFRARED HEATING CALCULATIONS**

		•				•		PAGE	PAGE 1 OF 3
BUILDING NUMBER:	6563	ı	BUILDING H OUTSIDE DE TEMPERATI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	VTURI URE	E SETPOINT: 60 F 1 F 59 F	յ <u> </u>		
INFILTRATION LOSSES = _	-	_ AIR CHGS X	73600	VOL (CUFT) X	59	F TEMP DIFF X 0.019	n i	0.08	MBTU/HR
FLOOR LOSSES =	320	LINEAR	LINEAR FEET OF PERIMETER	IMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.03	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	_AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	п	90.0	MBTU / HR
CORR MTL PNL WALL =		_AREA(SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR
CLR SGL PANE WINDOWS =	1123	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.08	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR
METAL ROLL UP DOORS =	•	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE . DIFFERENCE	11	0.00	MBTU / HR
METAL GLAZED O'HEAD DR =	1372	– AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU/HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	ii	0.00	MBTU / HR
•		l	•				1		ı

MBTU / HR MJ/HR

0.28 299.19

H H

**TOTAL BASELINE HEAT LOSSES** 

# **ECO - 1: INFRARED HEATING CALCULATIONS**

								-	PAGE 2 OF	2 OF 3
BUILDING NUMBER:	6563			BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATU TUR	RE SETPOINT: 55	! !L  L  L		
INFILTRATION LOSSES =	-	AIR CHGS	×	73600	VOL (CU FT) X	54	54 F TEMP DIFF X 0.019	11	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAF	H ~	LINEAR FEET OF P	PERIMETER X	54	F TEMP DIFF X 0.81	11	0.01	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF)	×	0.105	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.03	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF)	×	0.176	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	AREA (SF)	×	0.389	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
CORR MTL PNL WALL =	0	AREA (SF)	×	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CLR SGL PANE WINDOWS ≒	1123	AREA (SF)	×	1.235	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.07	MBTU / HR
TINTED DBL PANE WIN'W ≈	0	AREA (SF)	×	0.65	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBT⊍ / HR
METAL ROLL UP DOORS =	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	1372	AREA (SF)	×	0.214	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF)	×	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=.	25	AREA (SF)	×	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
					TOTAL ECC	里	TOTAL ECO HEAT LOSSES	11	0.26	MBTU / HR
								Ħ	273 83	

MBTU / HR MJ/HR

0.26 273.83

11 11

ECO - 1: INFRARED HEATING CALCULATIONS

BASELINE
%09
~
9
4616
0.28
í
\$6.60
\$4.62
\$10.84

BUILDING NUMBER (	6563
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLAB F	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRICA	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM A	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

	ANNUAL HEATING	TING ENERGY	ENERGY CONSUMPTION (DEGREE DAY METHOD)	(DEGREE I	JAY N	<b>IETHOD</b>		
BASELINE =	0.28	MBTU / HR X 4616 SYS EFF X 59	J/HR X 4616 DEGREE DAYS X 24 HRS/DAY EFF X 59 TEMP DIFFERENCE	4 HRS/DAY	ŧI	887.50	MBTU/YR	
	887.50	MBTU/YR X	CORR FACTOR	<del></del>	11	٠	887.50	MBTU/YR
ECO - 1 =	0.26	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	4 HRS/DAY		435.29	MBTU/YR	
	435.29	MBTU/YR X	CORR FACTOR	<del>-</del>	II	l	435.29	MBTU/YR
	ECO -1	ANNUAL HEATING	ECO -1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	DN SAVNGS	11 11		452.21 477,080.96	MBTU/YR MJ/YR

	ANNUAI	ANNUAL HEATING ENERGY COST	NERG	YCOST				
BASELINE =	887.50	MBTU/YR X 6.6	9.9	\$ /MBTU	li	5,857.50 \$ /YR	\$ /⁄R	•
ECO - 1 =	435.29	MBTU/YR X 4.62	4.62	\$ /MBTU	н	= 2,011.04 \$ MR	- <b>\$</b> /⁄R	
	ECO -1 ANN	ECO -1 ANNUAL HEATING ENERGY COST SAVINGS	ENERGY	COSTSAVINGS	11	3,846.46 \$ MR	\$ MR	

	LL.	FT KNOX	Z LIN	KNOX LIMITED EEAP (GLASS)	(G)	(SSA)		•	
	E	ECO - 1: INFI	RARE	1: INFRARED HEATING CALCULATIONS	LCL	JLATIONS			
BUILDING NUMBER:	6564		BUILDI	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE	TURE	SETPOINT: 60 F	<u> </u>	PAGE	E 1 OF 3
			TEMPE	TEMPERATURE DIFFERENCE	!	59	. <b>L</b>		
INFILTRATION LOSSES =	-	AIR CHGS X	73600	O VOL (CUFT) X	59	F TEMP DIFF X 0.019	11	0.08	MBTU/HR
FLOOR LOSSES =	320	LINEAR	FEET OF	LINEAR FEET OF PERIMETER X	59 F	F TEMP DIFF X 0.81	Ħ	0.02	MBTU/HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.03	MBTU/HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	Ш	90.0	MBTU / HR
CORR MTL PNL WALL =		AREA (SF) X	0.17		29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	1123	AREA (SF) X	1.235		29	F TEMPERATURE DIFFERENCE	IJ	0.08	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65		59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL ROLL UP DOORS =		AREA (SF) X	0.56		29	F TEMPERATURE DIFFERENCE	. "	0.00	MBTU/HR
- METAL GLAZED O'HEAD DR =	1372	AREA (SF) X	0.214		29	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56		59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56		29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615		29	F TEMPERATURE DIFFERENCE	i 11	0.00	MBTU/HR
•				TOTAL BASELINE HEAT LOSSES	. IN .	IEAT LOSSES	H H	0.28 299.19	MBTU / HR MJ/HR

			IM	KNOX LIMITED EEAP (GLASS)	GLASS)			
	ECO		RED !	1: INFRARED HEATING CALCULATIONS	ULATIONS			
							PAGE 2 OF	2 OF 3
BUILDING NUMBER:	6564	<b>80</b> F	UILDING UTSIDE EMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	JRE SETPOINT: 55 F RE 1 F 54 F	_ 		
INFILTRATION LOSSES =	_	AIR CHGS X	73600	VOL (CU FT) X 54 F TEMP DIFF	F TEMP DIFF X 0.019	"	0.08	MBTU / HR
FLOOR LOSSES =	320	LINEAR FEET OF PERIMETER	T OF PE	ERIMETER X 54	F TEMP DIFF X 0.81	11	0.01	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	4800	AREA (SF) X	0.105	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE DIFFERENCE	11	0.03	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2440	AREA (SF) X	0.389		F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
CORR MTL PNL WALL =	0	AREA (SF) X	0.17	U VALUE (BTU/ 54 HR-SF-F) X	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
CLR SGL PANE WINDOWS =	1123	AREA (SF) X	1.235	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE DIFFERENCE	II	0.07	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ 54 HR-SF-F) X	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL ROLL UP DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR-SF-F) X	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	1372	AREA (SF) X	0.214	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X 54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR

MBTU / HR MJ/HR

0.26 273.83

11 11

**ECO - 1: INFRARED HEATING CALCULATIONS** 

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	-
HTG TEMP SETPOINT (F)	09	55
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0.28	0.26
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

		SHRAE ING EFFECT VS 2	
	ERMS	SULATED FROM AS FACTOR FOR HEAT ENTALS 1989 PG28	
6564	GLOSSARY OF TERMS	AB PERIMETER UNIN RICAL CORRECTION M ASHRAE FUNDAM	
<b>BUILDING NUMBER</b>		1 MBTU = 1055 MJ 0.019=CONSTANT .81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS 65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2	

	ANNUAL HEATIN	ATING ENERGY	00 \	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY	METHO	(a	
BASELINE =	0.28	MBTU/HR X 46 SYS EFF X 5	316 D 59 TE	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	II	887.50	MBTU/YR	
•	887.50	MBTU/YR	×	CORR FACTOR 1	11		887.50	MBTUMR
ECO - 1=	0.26	MBTU / HR X 3396 DEGREE DAYS X SYS EFF X 54 TEMP DIFFERENCE	396 D 54 TE	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	11	435.29	MBTU/YR	
	435.29	MBTU/YR	×	CORR FACTOR 1	II		435.29	MBTU/YR
	ECO - 1	ANNUAL HEATING	G ENE	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	11 11		452.21 477,080.96	MBTU/YR MJ/YR

	ANNUAL	ANNUAL HEATING ENERGY COST	NERG	Y COST				
BASELINE =	887.50	MBTU/YR X 6.6	6.6	\$ /MBTU	II	5,857.50 \$ /YR	\$ MR	
ECO -1=	435.29	MBTU/YR X 4.62	4.62	\$ /MBTU	п.	= 2,011.04 \$ /YR	\$ /YR	
	ECO - 1 ANNI	UAL HEATING E	:NERGY (	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS	11	3,846.46 \$ IYR	\$ /YR	

		FT KNOX	LIMIT	KNOX LIMITED EEAP (GLASS)	<b>9</b> )	LASS)		,	
	ECO		RARED	- 1: INFRARED HEATING CALCULATIONS	רכו	JLATIONS			*****
BUILDING NUMBER:	6576		BUILDING F	BUILDING HEATING TEMPERATURE SETPOINT:	TURE	09	 	PAGE 1	1 OF 3
		•	TEMPERAT	TEMPERATURE DIFFERENCE	Ĭ	59 F	عار ـ		
INFILTRATION LOSSES =	~-	AIR CHGS X	114900	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.13	MBTU / HR
FLOOR LOSSES =	350	LINEAR FI	LINEAR FEET OF PERIMETER	RIMETER X	29	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	H	0.04	MBTU/HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	Ш	0.00	MBTU/HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.07	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	90.0	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL ROLL UP DOORS =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR
METAL GLAZED O'HEAD DR =	1344	AREA (SF) X	0.214	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
		•		INTOH		. OBSOCITABLEM TO SECTION OF THE PROPERTY OF T	ı		
				IOIAL BASEI		TEAT LOSSES	11 11	0.34 359.33	MJ/HR

	î	1	1	
	7			
	•	'		
	•	9	Ĺ	
	_			
	(		1	
	;	Ξ	_	
	,	•		
	L	1		
•	4	1		
	L	1		
	ī	1	j	
	_			
			1	
	ı	L		
	į	_	_	
•	2	>		
	-			
	•	-	J	
	•	_	•	
	1	_	•	
	7	_	J	
	2	2		
	•	<		
	-			
	ŀ	_		
	L	Į	_	

## **ECO - 1: INFRARED HEATING CALCULATIONS**

								PAGE 2 OF	2 OF 3
BUILDING NUMBER:	6576		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	ATUF TURE	E SETPOINT: 55	ᄠᄔᄣ		
INFILTRATION LOSSES =	-	AIR CHGS X	114900	VOL (CUFT) X 54 F TEMP DIFF	54 F	TEMP DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR FI	EET OF PE	LINEAR FEET OF PERIMETER X	54 F	F TEMP DIFF X 0.81	H H	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR.SF.E) X	54	F TEMPERATURE	н	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	H	00.00	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	Ħ	90.0	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.01	MBTU / HR
CLR SGL. PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	•	AREA (SF) X	0.65	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	00.00	MBTU / HR
METAL ROLL UP DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	1344	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR,- SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR

MBTU / HR MJ/HR

0.31 328.88

11 11

### **ECO - 1: INFRARED HEATING CALCULATIONS**

ECO - 1	%			_ 	Σ		09	62	
ECC	%06	_	55	3396	0 33	ś	\$6.60	\$4.62	9.00
BASELINE	%09	<b>-</b>	09	4616	0.34		\$6.60	\$4.62	70076
	SYSTEM EFFICIENCY	OUTSIDE DESIGN TEMP (F)	HTG TEMP SETPOINT (F)	HEATING DEGREE DAYS	TOTAL HEAT LOSSES	(MBTU / HR)	\$ /MBTU -FUEL OIL	\$ /MBTU -NATURAL GAS	(CC - 11-01-6)

BUILDING NUMBER 6576
GLOSSARY OF TERMS
1 MBTU = 1055 MJ
0.019=CONSTANT
.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

A	ANNUAL HEATIN	TING ENERGY	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	REE DA	Y METHO	(0)	
BASELINE =	0.34	MBTU / HR X 461 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	JAY =	1,065.90	MBTU/YR	
	1,065.90	MBTU/YR X	CORR FACTOR 1			1,065.90	MBTU/YR
ECO - 1 =	0.31	MBTU / HR X 339 SYS EFF X 54	MBTU/HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE .	)AY =	522.79	MBTU/YR	
	522.79	MBTU/YR X	CORR FACTOR 1	II		522.79	MBTU/YR
	ECO - 1	ANNUAL HEATING	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS	"NGS		543.11 572,980.27	MBTU/YR MJ/YR

	ANNOAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST				
BASELINE =	1,065.90	1,065.90 MBTU/YR X 6.6	9.9	\$ /MBTU	II	= 7,034.93 \$ MR	8 7 €	
ECO - 1 =	522.79	MBTU/YR X 4.62	4.62	\$ /MBTU	11	= 2,415.28 \$ /YR	\$ /YR	
	ECO - 1 ANNI	JAL HEATING E	NERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS =	11	4.619.64 \$ /YR	S VR	

•		FT KNOX	LIMI	KNOX LIMITED EEAP (GLASS)	9	(FASS)		•	
	Щ	ECO - 1: INFR	ARED	1: INFRARED HEATING CALCULATIONS	CC	JLATIONS			
		•						PAGE	1 OF 3
BUILDING NUMBER:	6577		BUILDING H DUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	TURE JRE	60	<u> </u>		
INFILTRATION LOSSES =	-	AIR CHGS X	114900	VOL (CUFT) X	29	F TEMP DIFF X 0.019	11	0.13	MBTU / HR
FLOOR LOSSES =	350	LINEAR FE	LINEAR FEET OF PERIMETER	RIMETER X	29	F TEMP DIFF X 0.81	II	0.02	MBTU / HR
SURFACE HEAT LOSSES									
FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	П	0.04	MBTU/HR
FACE BRICK/BLK WALL =		_AREA(SF) X	0.176	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU/HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	H	0.07	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.01	MBTU/HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	90:0	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
METAL ROLL UP DOORS =		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	. 69	F TEMPERATURE DIFFERENCE	. 11	0.00	MBTU / HR
METAL GLAZED O'HEAD DR =	1344	AREA (SF) X	0.214	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	Ħ	0.00	MBTU / HR
METAL PERSONNEL DR=		AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	25	AREA (SF) X	0.615	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
•				Total basei	Ä.	TOTAL BASELINE HEAT LOSSES	11 11	0.34 359.33	MBTU / HR MJ/HR

	U.	)
	U,	)
	4	ļ
		í
	<u>U</u>	_
	n	
	7	7
•	1	ì
	ΪĪ	i
	_	_
	H	ļ
	쁜	4
		=
	2	2
	_	Ī
	×	
	C	j
	ž	2
	$\overline{\mathbf{z}}$	7
	_	_
	ш	_

## **ECO - 1: INFRARED HEATING CALCULATIONS**

BUILDING NUMBER:								PAGE 2 OF	2 OF 3
	6577	<b>BO</b>	UILDING H UTSIDE D EMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	VTUF URE	RE SETPOINT: 55	<u> </u> 		
INFILTRATION LOSSES =	_	AIR CHGS X 114900	114900	VOL (CUFT) X 54 F TEMP DIFF	54 F	TEMP DIFF X 0.019	11	0.12	MBTU / HR
FLOOR LOSSES =	350	LINEAR FEET OF		PERIMETER X 6	54 F	F TEMP DIFF X 0.81	11	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	0069	AREA (SF) X	0.105	U VALUE (BTU/ E HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.04	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	11	00.0	MBTU / HR
8" CINDER BLOCK WALL =	2936	AREA (SF) X	0.389	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	n	90.0	MBTU / HR
CORR MTL PNL WALL =	1165	AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	54	F TEMPERATURE DIFFERENCE	#1	0.01	MBTU / HR
CLR SGL PANE WINDOWS =	. 760	AREA (SF) X	1.235	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	H	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ HR-SF-F) .X	54	F TEMPERATURE DIFFERENCE	п.	0.00	MBTU/HR.
METAL ROLL UP DOORS =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR-SF-F) X	24	F TEMPERATURE DIFFERENCE	Ш	0.00	MBTU / HR
WOOD GLAZED O'HEAD DR =	1344	AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.02	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	н	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	. 25	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	54	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR

MBTU / HR MJ/HR

0.31 328.88

11 11

### **ECO - 1: INFRARED HEATING CALCULATIONS**

									···-
ECO - 1	%06	-	55	3396	0 34	5.5	\$6.60	\$4.62	\$10 R4
BASELINE	%09	τ-	09	4616	0 37	5.0	\$6.60	\$4.62	\$10 R4
	SYSTEM EFFICIENCY	OUTSIDE DESIGN TEMP (F)	HTG TEMP SETPOINT (F)	HEATING DEGREE DAYS	TOTAL HEAT LOSSES	(MBTU / HR)	\$ /MBTU -FUEL OIL	\$ /MBTU -NATURAL GAS	A /MRTII _ PPG

BUILDING NUMBER	6577
	GLOSSARY OF TERMS
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLA	.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE
CORR FACTOR = EMPIR	CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS
65 F DEGREE-DAYS FROI	65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2

A	ANNUAL HEATING	TING ENERG	3 X C	G ENERGY CONSUMPTION (DEGREE DAY METHOD)	DAY	METHO	(a	
BASELINE =	0.34	MBTU / HR X 4 SYS EFF X	4616 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	II.	1,065.90	MBTU/YR	
	1,065.90	MBTU/YR	×	CORR FACTOR 1	ŧ1		1,065.90	MBTU/YR
ECO - 1 =	0.31	MBTU/HR X 3 SYS EFF X	3396 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	II I	, 522.79	MBTU/YR	
	522.79	MBTU/YR	×	X CORR FACTOR 1	11	·	522.79	MBTU/YR
	ECO - 1	ANNUAL HEATIN	G EN	ECO - 1 ANNUAL HEATING ENERGY CONSUMPTION SAVINGS			543.11 572,980.27	MBTU/YR MJ/YR

		ANNUAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST				
•	BASELINE =	1,065.90	MBTU/YR X 6.6	9.0	\$ /MBTU	H	7,034.93 \$ /YR	\$ MR	•
	ECO - 1 =	522.79	MBTU/YR X 4.62	4.62	\$ /MBTU	11	= 2,415.28 \$ /YR	_\$ //R	
		ECO - 1 ANNL	JAL HEATING E	:NERGY	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS	11	4,619.64 \$ MR	\$ MR	

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: 6592EC01
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.080

INSTALLATION & LOCATION: FORT KNOX REGION NOS. 4 CENSUS: 3

PROJECT NO. & TITLE: 6592ECO1 ECO-1 INFRARED HEAT FISCAL YEAR 95 DISCRETE PORTION NAME: INFRARED

ANALYSIS DATE: 10-18-94 ECONOMIC LIFE 20 YEARS PREPARED BY: JAH

- 1. INVESTMENT
- A. CONSTRUCTION COST \$ 34056.

  B. SIOH \$ 1703.

  C. DESIGN COST \$ 1703.

  D. TOTAL COST (1A+1B+1C) \$ 37462.

- E. SALVAGE VALUE OF EXISTING EQUIPMENT \$
- F. PUBLIC UTILITY COMPANY REBATE
- G. TOTAL INVESTMENT (1D 1E 1F) 37462.
- 2. ENERGY SAVINGS (+) / COST (-)

DATE OF	דייי אד כיייד	R 85-	-3273-X	USED FOR	DISC	ТИПО	FACTORS	OCT 1	993		
DATE OF	147011		COST	SAVINGS	;	ANNU	AL \$	DISCO	UNT		COUNTED
FUE	L	\$/MB7	ru(1)	MBTU/YR(	(2)	SAVII	IGS (3)	FACTO	R(4)	SAV	INGS (5)
Α.	ELECT	\$.	.00	0.	:	\$	0.	15	.61	\$	0.
В.	DIST	\$ 6.	.60	0.		\$	0.	17	.56	\$	0.
C.	RESID	\$.	.00	0.	:	\$	Ο.	19	.97	\$	0.
D.	NAT G	\$ 4.	. 62	671.	:	\$	3100.	20	.96	\$	64973.
E.	COAL	\$.	.00	0.	:	\$	0.	17	.58	\$	0.
F.	LPG	\$.	.00	0.	:	\$	0.	16	.12	\$	0.
. M.	DEMAND	SAVI	INGS		1	\$	0.	14	.74	\$	0.
N.	TOTAL			671.	;	\$ .	3100.		•	\$	64973.

3. NON ENERGY SAVINGS(+) / COST(-)

5. SIMPLE PAYBACK PERIOD (1G/4)

- A. ANNUAL RECURRING (+/-) 990.
- (1) DISCOUNT FACTOR (TABLE A) 14.74 (2) DISCOUNTED SAVING/COST (3A X 3A1) 14593.
- B. NON RECURRING SAVINGS(+) / COSTS(-)

1.	ITEM REPAIR		IGS(+) YR ST(-) OC (1) (2) 5992. 5	DISCNT FACTR (3) .86	DISCOUNTED SAVINGS(+)/ COST(-)(4) 3433.
2.	REPAIR2 REPAIR3 REPAIR4	\$ 3	992. 15 211. 7 211. 14	.63 .81 .65	2515. 2601. 2087.
đ.	TOTAL		407.	.03	10637.

- C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 25229.
- 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3Bd1/(YRS ECONOMIC LIFE))\$ 4810.
- \$ 90202. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C)
- 7. SAVINGS TO INVESTMENT RATIO (SIR) = (6 / 1G) =2.41 (IF < 1 PROJECT DOES NOT QUALIFY)
- 7.73 % 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

7.79 YEARS

	=========	======	========	=========		========
Estimate: Description:	BLDG 6592 COST ESTIN	IATE	Date:	14-Oct-94		
Estimate: Description: Project: Location: Sq. footage:	LIMITED EF FORT KNOX, 8100.00	AP (GLAS: KY	SBid Date: Job #: City indx	94013.02 :Louisville,	, KY	
Line #						
TIUE #						
===:===================================	Manhours	Matl ======	Labor =======	Equipment	Sub =======	Total
			•			
0205543200	4 "DIAMETE	!R			300 00	L.F.
Unit values Totals	0.15 45.00	0.00 \$0	3.16 \$947	· 1.29 \$386	0.00 \$0	4.44 \$1,333
0207100200	בוננות כי בטביאור	DOTTED (	מאפי/הדד פייי	T -1EOMDII		
Unit values Totals					0.00 \$0	323.82 \$324
0207183600	HVAC DEMO,	MECH EQI	PT HEAVY I	TEM	0.50	Ton
Unit values Totals	14.55 7.27	0.00 \$0	380.36	0.00 \$0	0.00 \$0	380.36 \$190
0208400600					ER PIPE	T 17
Unit values Totals	0.07 21.30	0.00 \$0	1.97 \$592	0.24 \$71	0.00	2.21 \$663
0208401000	REMOVE INS	ULATION	FROM PIPE	FITTING, UP	TO 4"	Fa
Unit values Totals	0.20 12.00	0.00	5.55 \$333	0.68 \$41	0.00	6.23 \$374
0268520600	GAS SERVIC	E&DISTR	IB PIPING,	SCH40 STEEL	PLAIN	<b>म</b> ा
Unit values Totals	0.11 5.70	2.19 \$109	3.18 \$159	0.19 \$9	0.00	5.55 \$277
U02 SITEWORK	104	\$109	\$2,545	\$507	\$0	\$3,161

	========			:=======	========	========
Line #	Description					
	Manhours	Matl	Labor	Equipment	Sub	Total
	= = = = = = = = = = = = = = = = = = = =			:========	========	========
1554510245	HTG INFA-RD	UNT GAS	ELEC IGN	I (See Att	ached for	Breakdown)
Unit values Totals	0.00	0.00 \$0	0.00 \$0	0.00 \$0		25219.00 \$25,219
U15 MECHANICAL	. 0	\$0	\$0	\$0	\$25.219	\$25.219

JOB TOTAL

\$34,056

	========	========	======			=======
Line #	Description	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
ESTIMATE TOTAL	104	\$109	\$2,545	\$507	\$25,219	\$28,380
SALES TAX MATL MARKUP LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00% 0.00% 0.00%	\$0 \$0	\$o	\$0	\$0	
TOTAL BEFORE C CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$109	\$2,545	\$507	\$25,219	\$28,380 \$2,838 \$0 \$2,838

Estimate: BLDG 6592 Date: 14-Oct-94 Description: COST ESTIMATE

Project:

LIMITED EEAP(GLASSBid Date:

94013.02

Location: Sq. footage: 8100.00

FORT KNOX, KY Job #: 94013.02 8100.00 City indx:Louisville, KY

54. 2000301		=======	-=======	========	========	=======
	ST	JMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=========	=======		========			
U02 SITEWORK U15 MECHANICAL	104	\$109 \$0	\$2,545 \$0	\$507 \$0	\$0 \$25,219	\$3,161 \$25,219
TOTAL	104	\$109	\$2,545	\$507	\$25,219	\$28,380
SALES TAX MATL MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
LABOR MARKUP EQUIPT MARKUP SUB MARKUP	0.00% 0.00% 0.00%		ŞU	\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 10.00% 0.00% 10.00%	\$109	\$2,545	\$507	\$25,219	\$28,380 \$2,838 \$0 \$2,838
JOB TOTAL						\$34,056

\_\_\_\_\_\_\_ Estimate: BLDG 6592 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE Description: LIMITED EEAP (GLASSBID Date: Project: FORT KNOX, KY Job #: Location: City indx:Louisville, KY Sq. footage: Description Manhours Matl Labor Equipment Sub \_\_\_\_\_\_ 115V, 20 AMP POWER WIRING INCL CONDUIT, WIRE, 0913100200 340.00 L.F. AND RECEPTACLES 6.79 4.57 Unit values 0.15 0.00 0.00 2.22 Totals 50.66 \$753 \$1,555 \$0 \$0 \$2,308 0913100200 . CO-RAY-VAC VANTAGE 2 POWER FEEDER INSTALLATION, INCL CONDUIT, WIRE, AND RECEPTACLES 120.00 L.F. 6.79 Unit values 0.15 2.22 4.57 0.00 0.00 Totals 17.88 \$266 \$549 \$0 \$0 \$815 69 \$1,019 \$2,104 \$0 \$0 \$3,123 A09 ELECTRICAL

Line #	Descriptio	n			•	
	Manhours	Matl	Labor	Equipment	Sub	Total
	========	======		•		
1517010650	77 / ODT OO				220 00	, 4" DIAM L.F.
Unit values Totals	0.44 146.52	4.17 \$1,376	10.30 \$3,400	0.00	0.00	14.47 \$4,776
1517011310	GAS SERVIC	E PIPE ST	EEL GALV	SCH 40 THRI	W/CPLG	& HNGR SZD
	57.15				0.00	4.52 \$2,032
1519010320	ALUMINUM R	EFLECTORS	w/HANGE	RS	45.00	Гэ
Unit values Totals	0.50 22.50	39.79 \$1,791	3.80 \$171	0.00	0.00	43.59
1524105040	VACUUM PUM	P AND VEN	T PIPING	<del>}</del>	1 00	۳n
Unit values Totals	3.00 3.00	738.35 \$738	120.15 \$120	0.00	0.00 \$0	858.50 \$858
1552301020	CRV-100 GA	S FIRED B	URNER, 1	.00 MBH & CO	MBUSTION 6.00	
Unit values Totals	1.00 6.00	860.00 \$5,160	44.06 \$264	. 0.00	0.00	904.06
1554510160	CO-RAY-VAC	VANTAGE	2 INFA-	RD HTG UNT,	GAS 100M	
Unit values Totals	6.00 6.00	1065.00 \$1,065	163.40 \$163	0.00 \$0	0.00	1228.40
1554510220	CO-RAY-VAC	VANTAGE	2 INFA-R	D HTG UNIT,	GAS 40 M	
Unit values Totals	4.00 16.00	935.00 \$3,740	81.70 \$327	0.00 \$0	0.00 \$0	1016.70 \$4,067
1556800120	CO-RAY-VAC	VANTAGE	2 VENT P	IPE	5.00	Fo
Unit values Totals	1.60 8.00	70.00 \$350	76.50 \$382		0.00	146.50 \$732
1574205220	ELECTRIC T	HERMOSTAT	W/ COVE	R AND WIRING	6.00	Fa.
Unit values Totals	1.00	75.00 \$450	27.55 \$165		0.00 \$0	102.55 \$615

=======================================	======	========	======	=======	=======	
Line #	Descript	ion				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======	=======	======			
U15 MECHANICAL	272	\$15,408	\$6,286	\$0	\$0	\$21,694
1631200100	HEATING	SYSTEM POWE	R / CONTI	ROL PANEL	1.00	Ea.
Unit values Totals	2.96 2.96	330.76 \$331	70.58 \$71	0.00 \$0	0.00	401.34 \$402
•					•	
U16 ELECTRICAL	3	\$331	\$71	\$0	\$0	\$402

Line #	Descripti	on				
	Manhours	Matl	Labor	Equipment	Sub	Total
		=======================================	= # # = = = # = = :	•		
ESTIMATE TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0
JOB TOTAL						\$25,219

Estimate:

BLDG 6592 Date: 14-Oct-94 INFRARED HEATING SYSTEM COST ESTIMATE

Description: Project:

LIMITED EEAP(GLASSBid Date:

FORT KNOX, KY

Location:

Job #: 94013.02

Sq. footage:

City indx:Louisville, KY

Sq. iootage:			city indx	:Dogravitie,	K1	
. = 2 = 2 = 5 = 5 = 5 = 5	S	UMMARY				
	Manhours	Matl	Labor	Equipment	Sub	Total
=======================================	=======					
A09 ELECTRICAL U15 MECHANICAL U16 ELECTRICAL	272	\$1,019 \$15,408 \$331	\$2,104 \$6,286 \$71	\$0 \$0 \$0	\$0 \$0 \$0	\$3,123 \$21,694 \$402
TOTAL	344	\$16,758	\$8,461	\$0	\$0	\$25,219
SALES TAX MATL MARKUP LABOR MARKUP	0.00% 0.00% 0.00%	\$0 \$0	\$0			
EQUIPT MARKUP SUB MARKUP	0.00% 0.00%			\$0	\$0	
TOTAL BEFORE CONTINGENCY BOND PROFIT	ONTINGENC 0.00% 0.00% 0.00%	\$16,758	\$8,461	\$0	\$0	\$25,219 \$0 \$0 \$0 \$0
JOB TOTAL						\$25,219

•	· 144-	FT KNOX		T KNOX LIMITED EEAP (GLASS)	(9)	LASS)		,	•
	Б	30 - 1: INFF	ARED	O - 1: INFRARED HEATING CALCULATIONS	רכח	ILATIONS			
							<u> </u>	PAGE	1 OF 3
BUILDING NUMBER:	6592		BUILDING H OUTSIDE D TEMPERAT	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	Ture Jre	SETPOINT: 60 F	յ <b> ,ւ.</b>		
INFILTRATION LOSSES =	-	AIR CHGS X	138900	VOL (CUFT) X	59 F	F TEMP DIFF X 0.019	II I	0.16	MBTU / HR
FLOOR LOSSES =	390	LINEAR F	LINEAR FEET OF PERIMETER	RIMETER X	59 F	F TEMP DIFF X 0.81	II	0.02	MBTU / HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.05	MBTU / HR
FACE BRICK/BLK WALL =		AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ HR - SF - F) X	- 69	F TEMPERATURE DIFFERENCE	11	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	II	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ HR-SF-F) X	29	F TEMPERATURE DIFFERENCE	н	90.0	MBTU / HR
TINTED DBL PANE WIN'W =		AREA (SF) X	0.65	U VALUE (BTU/ HR-SF-F) X	59	F TEMPERATURE DIFFERENCE	H	0.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ • HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.06	MBTU / HR
METAL GLAZED O'HEAD DR =		AREA (SF) X	0.214	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU/HR
LG MTL SLIDING DOOR =		AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	II	0.00	MBTU / HR
METAL PERSONNEL DR=	٠	AREA (SF) X	0.56	U VALUE (BTU/ HR - SF - F) X	59	F TEMPERATURE DIFFERENCE	n	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=	50	AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X	29	F TEMPERATURE DIFFERENCE	11	0.00	MBTU / HR
				TOTAL BASEI	INE H	TOTAL BASELINE HEAT LOSSES	11 11	0.42 443.92	MBTU/HR MJ/HR

# FT KNOX LIMITED EEAP (GLASS)

# **ECO - 1: INFRARED HEATING CALCULATIONS**

		·				PAG	PAGE 2 OF 3
BUILDING NUMBER:	6592		BUILDING OUTSIDE TEMPERA	BUILDING HEATING TEMPERATURE SETPOINT: OUTSIDE DESIGN TEMPERATURE TEMPERATURE DIFFERENCE	JRE SETPOINT: 55 F		
INFILTRATION LOSSES =	-	AIR CHGS X	138900	VOL (CUFT) X 54	F TEMP DIFF X 0.019 =	0.14	MBTU / HR
FLOOR LOSSES =	390	LINEAR FEET OF	ET OF PE	PERIMETER X 54	F TEMP DIFF X 0.81 =	0.02	MBTU/HR
SURFACE HEAT LOSSES FLAT BUILT UP ROOF =	8100	AREA (SF) X	0.105	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0.05	MBTU / HR
FACE BRICK/BLK WALL =	0	AREA (SF) X	0.176	U VALUE (BTU/ HR - SF - F) X 54	F TEMPERATURE = DIFFERENCE	0.00	MBTU / HR
8" CINDER BLOCK WALL =	2743	AREA (SF) X	0.389	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	90.0	MBTU / HR
CORR MTL PNL WALL =	1685	AREA (SF) X	0.17	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0.02	MBTU / HR
CLR SGL PANE WINDOWS =	760	AREA (SF) X	1.235	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0.05	MBTU / HR
TINTED DBL PANE WIN'W =	0	AREA (SF) X	0.65	U VALUE (BTU/ 54 HR-SF-F) X 54	F TEMPERATURE = DIFFERENCE . =	0.00	MBTU / HR
METAL ROLL UP DOORS =	1792	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0.02	MBTU / HR
WOOD GLAZED O'HEAD DR =	0	AREA (SF) X	0.214	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0.00	MBTU / HR
LG MTL SLIDING DOOR =	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR - SF - F) X	F TEMPERATURE = DIFFERENCE	0.00	MBTU / HR
METAL PERSONNEL DR=	0	AREA (SF) X	0.56	U VALUE (BTU/ 54 HR-SF-F) X	F TEMPERATURE = DIFFERENCE	0.00	MBTU / HR
MTL/ GLAZED PERSONNEL=		AREA (SF) X	0.615	U VALUE (BTU/ HR - SF - F) X 54	F TEMPERATURE DIFFERENCE	0.00	MBTU / HR
						1	}

MBTU / HR MJ/HR

0.39 406.30

B II

TOTAL ECO HEAT LOSSES

# FT KNOX LIMITED EEAP (GLASS)

# **ECO - 1: INFRARED HEATING CALCULATIONS**

PAGE 3 OF 3

	BASELINE	ECO - 1
SYSTEM EFFICIENCY	%09	%06
OUTSIDE DESIGN TEMP (F)	-	-
HTG TEMP SETPOINT (F)	90	22
HEATING DEGREE DAYS	4616	3396
TOTAL HEAT LOSSES	0.40	0.30
(MBTU / HR)	0.42	6.0
\$ /MBTU -FUEL OIL	\$6.60	\$6.60
\$ /MBTU -NATURAL GAS	\$4.62	\$4.62
\$ /MBTU -PPG	\$10.84	\$10.84

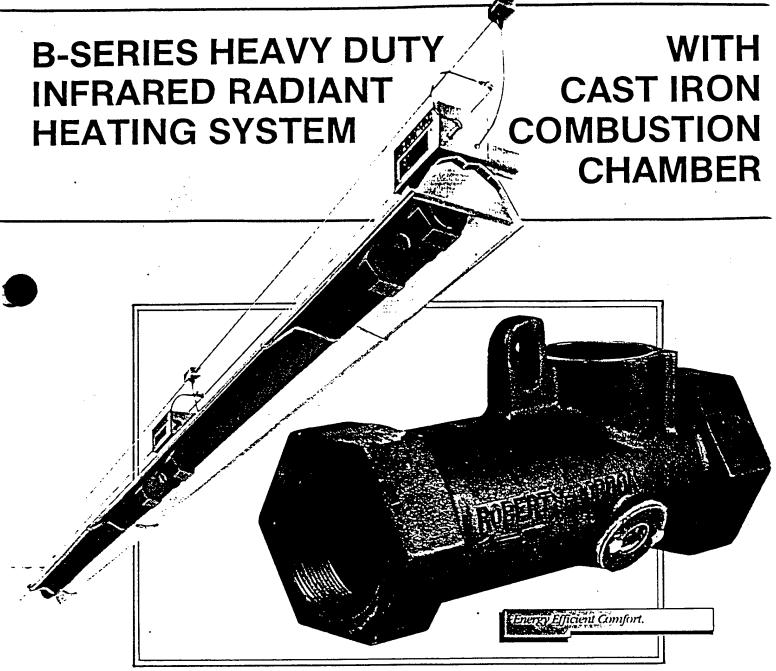
BUILDING NUMBER 6592	
GLOSSARY OF TERMS	
1 MBTU = 1055 MJ	
0.019=CONSTANT	
.81 = CONSTANT FOR SLAB PERIMETER UNINSULATED FROM ASHRAE	
CORR FACTOR = EMPIRICAL CORRECTION FACTOR FOR HEATING EFFECT VS	ECT VS
65 F DEGREE-DAYS FROM ASHRAE FUNDAMENTALS 1989 PG28.2	

	ANNUAL HEA	TING ENERGY	ANNUAL HEATING ENERGY CONSUMPTION (DEGREE DAY METHOD)	JAY METHO	(00	
BASELINE =	0.42	MBTU/HR X 4616 SYS EFF X 59	MBTU / HR X 4616 DEGREE DAYS X 24 HRS/DAY SYS EFF X 59 TEMP DIFFERENCE	= 1,316.82	MBTU/YR	
	1,316.82	MBTU/YR X	CORR FACTOR 1	II	1,316.82	MBTU/YR
ECO - 1=	0.39	MBTU/HR X 3396 SYS EFF X 54	MBTU / HR X 3396 DEGREE DAYS X 24 HRS/DAY SYS EFF X 54 TEMP DIFFERENCE	= 645.86	MBTU/YR	
	645.86	MBTU/YR X	CORR FACTOR 1	11	645.86	MBTU/YR
	ECO - 1 ANNU	ANNUAL HEATING	AL HEATING ENERGY CONSUMPTION SAVINGS	11 11	670.96 707,867.19	MBTU/YR MJ/YR

	ANNUAL	ANNUAL HEATING ENERGY COST	ENERG	Y COST			
BASELINE =	1,316.82	MBTU/YR X 4.62	4.62	\$ /MBTU	II	= 6,083.73 \$ /YR	\$ MR
ECO - 1 =	645.86	MBTU/YR X 4.62	4.62	\$ /MBTU	11	2,983.87 \$ MR	\$ /YR
	ECO - 1 ANNL	JAL HEATING E	ENERGY (	ECO - 1 ANNUAL HEATING ENERGY COST SAVINGS =	H	3,099.85 \$ IYR	\$ //R

# CO-RAY-VAC





CO-RAY-VAC "Classic" B-Series Heavy Duty Systems Feature Cast Iron Combustion Chambers, Burners, Vacuum Pump Housing & Schedule 40 Pipe to Combine "Built Like They Used To" Durability with the Latest in Modern Gas Combustion Technology.

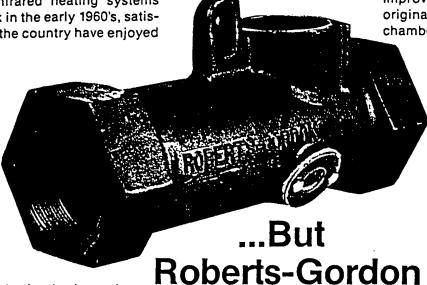
PAGE 4-436



# Everyone Says, "They Don't Build Them Like They Used To..."

Since CO-RAY-VAC infrared heating systems were first installed back in the early 1960's, satisfied customers around the country have enjoyed

years of troublefree operation with
our heavy duty cast
iron heating systems. Everyone
says, "They don't
build them like they
used to,"...But
Roberts-Gordon
does. CO-RAY-VAC
heavy duty systems
are still available
today. They feature
all the modern



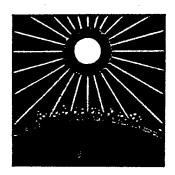
improvements, but keep the original cast iron combustion chamber, burners and vacuum

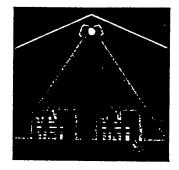
pump housing for rugged durability and top performance year after year. Offered exclusively by Roberts-Gordon, the CO-RAY-VAC "Classic" heavy duty series is especially suited for installations where an extended lifetime of trouble-free service is desired.

 Roberts-Gordon cast iron combustion chambers and vacuum pump housing are warranteed for 15 years against manufacturing defects and defects in workmanship.

# CO-RAY-VAC Gas-Fired, Fully Vented, Low-Intensity Radiant Heating System

Does!





## **How Infrared Heating Works**

High-efficiency CO-RAY-VAC heating systems warm the workplace in the same manner as the sun heats the earth. Like the sun, CO-RAY-VAC produces infrared rays. These low-intensity rays are directed downward by specially designed reflectors to spread a draftless lanket of warmth that heats the floor, people and bjects directly. The warm floor and objects then release heat to warm the air. Since solid objects, not the air, are heated directly, people are comfortable at lower building thermostat settings.

# Outstanding Efficiency, Comfort and Savings

Design-Certified by the American Gas Association.

Outstanding Energy Efficiency—Independently tested Annual Fuel Utilization (AFUE) rating of 90.43%.

Fuel Cost Savings — Customers document savings up to 50% and more on their annual heating costs.

Low Maintenance — Cast iron combustion chambers, burners & vacuum pump housings are especially designed for trouble-free service.

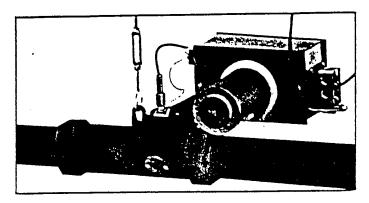
Clean, Quiet, Draft-Free, Uniform Heat—CO-RAY-VAC spreads heat evenly over large areas without noise, drafts or blasts of hot air. No swirling dust or grit, and no interference with your operations.

Greater Worker Comfort & Productivity — Because of the principle of CO-RAY-VAC infrared heating, employees are more comfortable in more favorable conditions. This can boost morale and productivity!

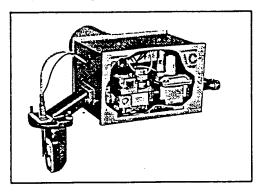
Faster Heat Recovery — Floor and objects act as heat reservoirs, giving off heat and providing fast heat recovery when large doors are closed.

# These are the features of the CO-RAY-VAC Heavy Duty Systems...

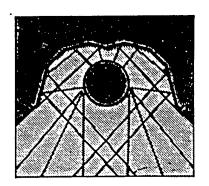
 Burners in series; wide range of inputs from 20,000 to 120,000 BTU for high and low mounting heights.



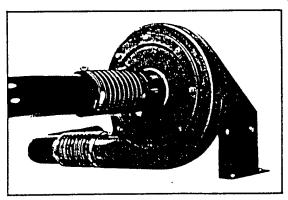
 Heavy duty cast iron combustion chamber for durability and long life.



Cast iron burner and modern direct spark electronic ignition systems eliminate standing pilots and are compatible with state-of-the-art temperature control systems.



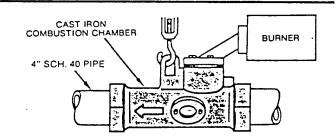
 Deep dish reflectors and perimeter reflectors maximize radiant output in all types of buildings.



- Totally enclosed vacuum pump motor for superior, trouble-free operation even in the most severe building environments.
- Can be suspended up to 60 ft. or more from the floor to clear gantry cranes, high rising equipment, etc.
- Fully vented, uses natural or propane gas.

# CO-RAY-VAC Heavy Duty Systems Similar to standard CO-RAY-VAC system, but stand-

Similar to standard CO-RAY-VAC system, but standard steel combustion chamber and standard radiant tube replaced with cast iron combustion chamber and schedule 40 steel radiant pipe.



• .		SPE	CIFICATION	VS		. · · · · · ·
MODEL	. CRV-B2	CRV-B4	CRV-B6	CRV-B8	CRV-B10	CRV-B12
GAS INPUT BTU/HR.	20,000	40,000	60,000	80,000	100,000	- 120,000
CLE	ARANCES T	O COMBUS	TIBLES WIT	H STANDAR	D REFLECTO	DR
ABOVE	4"	4"	4"	4"	4"	4"
BELOW	48"	48"	48"	48"	60"	60"
SIDE	20"	20"	20"	20"	36"	36"

PAGE 4-438

# eavy Duty Cast

Marplex Products Co., Inc.

June 9, 1987

Wisconsin Instument & Control, Inc. Mr. Harold Steineke 3196 N. Main Street Oshkosh, WI 54901

Dear Mr. Steineke:

It is interesting to discover that Marplex's Co-Ray-Vac heating system was the first installation in Wisconsin and also one of the first in the country.

I am pleased to advise you that our system works very well even after 25 years. Our maintenance is minimal and we are looking forward to the next quarter century of operation.

sincerely.

MARPLEX PRODUCTS CO., INC.

James L. Sweet V-Pres. & Gen. Mgr.

Rhinelander, Wisconsin 54501. (716) 362-3193

Breach Mold & Tool New Albany, IN

Brennan Marine Bay City, MI

Clover Park Technical School Tacoma, WA

**Dakota Block Company** Rapid City, SD

**Daytonna Country Club** Dayton, MN

Hass Cabinet Company Sellersburg, IN

La Choy Food Products Archbold, OH

Lang Manufacturing Redmond, WA

# Chambers have provided dependable service for

15 years

or more:

Rail's Autobody Repair Belle Fourche, SD

Rice County Highway Department Fairbault, MN

Robinson Welding Livonia, MI

Sauder Woodworking Company Archbold, OH

**Scott Electric** Greensburg, PA

Stoddard Aero Service Anchorage, AK

**Tower Tool Company** Fraser, MI

White Castle Systems Carteret, NJ

William Britland Auto Body, Inc. Green Brook, NJ



CO-RAY-VAC

Roberts-Gordon, Inc.

Subsidary of A.J. Industries Inc. 1250 William Street • P.O. Box 44 • Buffalo, NY 14240 Phone: (716) 852-4400 • FAX: (716) 852-0854

CALL TOLL FREE: 1-800-828-7450 IN NEW YORK STATE: 1-800-221-0955



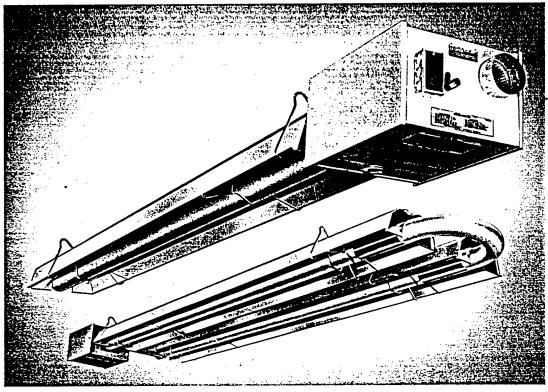
RODNEY WILL, INC. Manufacturers' Representative

2104 NORTHFIELD DRIVE LOUISVILLE. KENTUCKY 40222 PHONE 502 425-3561 FAX 502 425-30/18 4-439



Cost-Saving, Low-Intensity Infrared Unitary Heaters





Roberts-Gordon, Inc.

Energy Efficient Comfort.

# VANTAGE II Unitary Heaters Lower Fuel Costs and Raise Comfort Levels.

# **Demonstrated Savings**

Modern gas combustion technology combined with the principles of infrared energy enable VANTAGE II heaters to reduce fuel costs substantially while improving comfort conditions. Users report heating bills cut by up to 50% or more!

# Low Cost...Easy to Install and Maintain

The VANTAGE II models are low-cost, field-assembled infrared heaters that are easy to install and require only minimal maintenance. They are designed to provide years of economical operation and trouble-free service.

# Versatility

VANTAGE II heaters can be installed separately or in combination to fit any floor plan. Straight, L- and U-tube configurations are available. Tube lengths are offered from 10 through 60 feet. Ideal for large areas as well as hard-to-heat spaces!

# Reliability and Expertise

Roberts-Gordon pioneered low-intensity infrared heating systems in 1962 and manufactures the broadest line of low-intensity heating equipment in North America. Backed by a limited three-year warranty, each VANTAGE II unitary heater is built to uphold the well-established Roberts-Gordon standards of engineering excellence, efficiency and reliability.

# **Applications Include:**

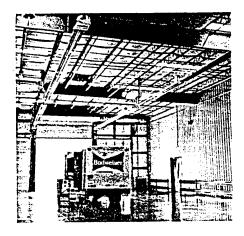
- Automotive Facilities
- Warehouses
- Manufacturing Facilities
- C

Clean, quiet, draft-free Vantage radiant heat is ideal for automotive service facilities. Unlike forced-air unit heaters, Vantage does not spread dirt, grit or dust.

- Fire Stations
- Agricultural Buildings
- Recreational Facilities

Vantage unitary heaters are available in a variety of lengths, shapes and configurations to fit any floor plan. Two straight-tube models are shown above in a car dealership.

- Machine Shops
- Aircraft Hangars
- Vehicle Maintenance Buildings



Floors are kept warm by Vantage infrared energy and act as heat reservoirs to provide rapid heat recovery after bay doors are closed in this warehouse/ shipping area.

### Features:

Extensive use of corrosion-resistant matérials.

- Weight-saving construction to ease installation.
- Forced draft design eliminates the need for a heat-siphoning draft hood.
- 10 through 60 foot tube lengths.
- Clean, quiet, draft-free heat.
- Three-year limited warranty on all components.
- A.G.A. design certified.

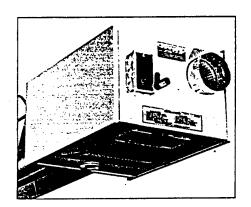
"The VANTAGE II heater utilizes design concepts and engineering principles proven by more than 25 years of infrared heating experience."

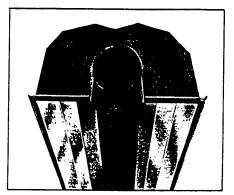
### **Burner Box:**

- 40,000; 60,000; 80,000; 100,000; 125,000 and 150,000 BTU/Hr. models available.
- Natural gas and L.P. models available.
- Moisture-resistant design.
- Nickel plated steel burner cup.
- Outside air adapter standard.
- Hot surface ignition.
- Three-try ignition module.
- Door interlock safety switch.
- All components easily accessed.
- Electrostatically applied paint.
- Durable spot welded construction.
- · Mica flame observation window.
- Balanced air rotor.
- Stainless steel flex gas line and high pressure gas cock included.

## Tube and Reflector:

- 4" diameter 16-gauge tubing.
- Quick assembly couplings.
- Deep-dish aluminum reflectors maximize energy reflection, beaming virtually all of the radiant heat downward.
- Reflectors can be tilted 45° to direct heat where needed.
- Entire U-tube heater also can be tilted 45°.
- End caps included.
- Nickel plated hangers.
- Chrome plated hardware.
- Flue connector included.
- 180° U-package option.
- 90° L-package option.
- Decorative grille option.
- Side reflector option.





# Architectural/Engineering Short Form Specifications VANTAGE II CTH2 Series

Gas-fired, vented, infrared heaters shall be furnished and installed in accord drawing(s) as described below.	dance with governing codes and as shown per building
Heaters shall be VANTAGE II, model number CTH2 Roberts-Gordon, Inc., Buffalo, New York.	BTU/Hr. as manufactured by

Heaters shall be equipped with a direct sense silicon-carbide hot surface ignition control system with 100% shut-off ignition device. Power supplied to each heater shall be 120V, 60Hz, 10. Heater to be equipped with totally enclosed motor with thermal overload motor protection, balanced air rotor, combustion air proving safety pressure switch, nickel plated burner cup, combustion chamber equipped with sight glass for visual inspection of igniter element and burner flame. Air intake collar standard. Radiant tube assembly to be 4" diameter, aluminized steel first 10 feet. Hot rolled steel remainder of unit. (Or at customer-option, aluminized steel for entire tube length.) Reflector to be of aluminum material and designed to direct all radiant output below horizontal centerline of radiant tube. Heaters shall be vented in accordance with manufacturer's recommendations as approved by A.G.A. and ANSI Z-223.1 National Fuel Gas Code. Heaters shall be so designed to operate without requiring heater modifications or adjustments on \_\_\_\_\_\_\_ gas having a net heating value of \_\_\_\_\_\_\_ BTU per cubic foot and a specific gravity of \_\_\_\_\_\_\_

Heaters shall be Design Certified by the American Gas Association (A.G.A.). Supplier shall provide a manufacturer's written varranty covering all components for a period of three (3) years.

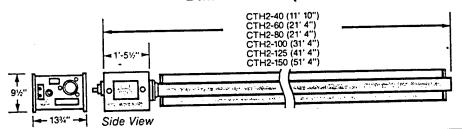


	FLUE	GAS CONNECTION	ELECTRICAL RATING	TUBE DIAMETER	IGNITION SYSTEM	MIN. GAS
F	4" (O.D.)	1/2" NPT	120VAC, 60Hz. 1.0 amp run 5.0 amp start	4"	Hot surface (Three-try)	Nat. 4.6" W.C. L.P. 11.0" W.C.

CTH2-40 40,000 95 lbs. CTH2-60 60,000 130 lbs.	MODEL	BTU/Hr. (Natural Gas or LP.)	SHIPPING WEIGHT
CTH2-80 80,000 130 lbs.	CTH2-40 CTH2-60	60,000	130 lbs.

MODEL 1	BTU/Hr. (Natural Gas	SHIPPING
CTH2-100	100,000	165 lbs.
CTH2-125	125,000	200 lbs.
CTH2-150	150,000	235 lbs.

## **DIMENSIONS (Standard Models) STRAIGHT**



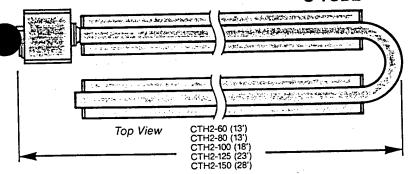
REFLECTOR HORIZONTAL



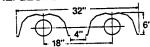
REFLECTOR TILTED



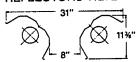
### **U-TUBE**

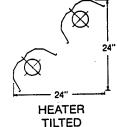


### REFLECTORS HORIZONTAL









## **CLEARANCES TO COMBUSTIBLES\***

	1. 1. 1	CTH2-4	1	12.00°	CTH2-6	0 3.5	***	CTH2-8	<b>0</b> 55 5	净。	CTH2-1	00 🚟	10	CTH2-1	25 🐴	Contraction of the contraction o	CTH2-1	50	
Configuration	Reflector	Тор	Below				Side		Below	_		Below	Side	Тор	Below	Side	Тор	Below	Side
Straight:	Horizontal	4"	50"	22"	4"	60"	30"	4"	63"	33"	4"	68"	35"	4"	74"	41"	4"	77"	45"
Straight	7 Tilted -	4"	45"	4"/42"	4"	54"	4"/50"	4"	60"	4"/56"	6"	68"	4"/60"	6"	72"	4"/65"	8"	78"	4"/70"
U-Tube	Horizontal		_	_	4"	60"	25"/30"	4"	66"	32"/33"	4"	73"	34"/35"	4"	76"	38"/41"	4"	81"	42"/45
्रिं U-Tube हैं	Tilted	<u> </u>	-	-	4"	54"	18"/50"	4"	60"	18"/56"	6"	68"	18"/60"	6"	72"	18"/66"	8"	78"	18"/70"

															20.00	4 14 14 4	25.5	.,	<b>6.5</b> 2
Configuration	- Heater:	Top	Below	Side	Тор	Below	Side	Тор	Below	Side	Тор	Below	Side	Тор	Below	Side.	Тор	Below	Side
Comigaration					411		4"/38"	A"		4"/42"	4"		4"/48"		72"	4"/57"	4"	78"	4"/62"
. U-Tube	Tilted	_	-		4	54	54 4 /36			<u> </u>	L <u>.</u>			ــــــــــــــــــــــــــــــــــــــ	·		L		

<sup>\*</sup>See installation manual for complete information.



# Roberts-Gordon, Inc.

P.O. Box 44 • Buffalo, NY 14240-0044 Phone: (716) 852-4400 • Fax: (716) 852-0854



CALL TOLL FREE: 1-800-828-7450 IN NEW YORK: 1-800-221-0955